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CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

No. 43

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USSR REPORT

CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

No. 43

This serial publication contains articles, abstracts of articles and news items from USSR scientific and technical journals on the specific subjects reflected in the table of contents.

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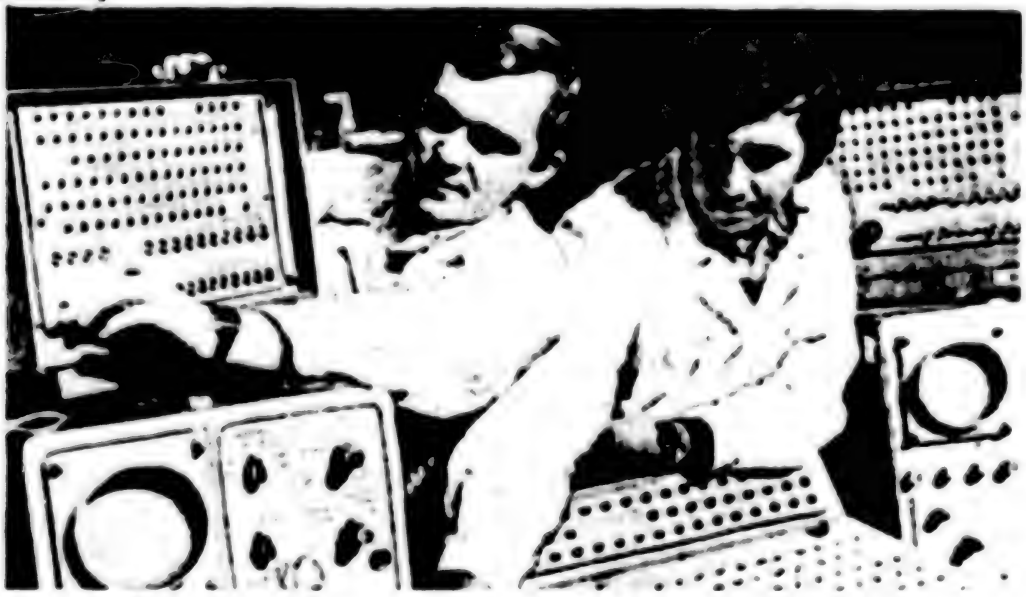
USSR

FRUNZE COMPUTER PLANT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian (Photo Caption) 13 May 79 p 4

[Abstract]



Photograph shows computers being assembled and adjusted at the Frunze Computer Plant imeni the Fiftieth Anniversary of the USSR.

CSO: 1863-P

B. Hardware

Abstracts of Articles

USSR UDC 681.3.29/.16

COMPUTATIONAL STRUCTURE WITH GRAPH-PROGRAMMED CONTROL

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 66-71 manuscript received 7 Oct 77; after completion, 13 Apr 78

KENCHEV, T. TS. and BOYANOV, KIRILL LYUBENOV, dr in technical sciences, Institute of Mathematics and Mechanics, Bulgarian Academy of Sciences (People's Republic of Bulgaria (Sofia))

[Abstract] Almost all known systems with parallel data processing execute commands in sequential order, and parallel execution of several commands in the processor is handled by preliminary examination of the flow of these instructions (look-ahead). A disadvantage of this type of organization is the sharp increase in control equipment with an increase in the number of simultaneously operating blocks in the processor. Besides, the effectiveness of utilization of these blocks is adversely affected by the impossibility of simultaneous execution of several programs in the case of conditional branchings. Some of these disadvantages can be circumvented by multiprocessor techniques, but the resultant increased number of shorter parallel program sections increases the expenditures of unproductive time in processor control. It is proposed that associative memories be used to implement graph-programmed control. An example is given of parallel execution of a fragment of a program. The proposed system ensures high parallelism of processor operation, economizes on memory capacity for storage of intermediate results, provides simple organization of multiprogramming and a simpler and more natural way to program certain computational problems. The greatest obstacle in the way of technical realization is the lack of associative memories with the required functional characteristics and adequate speed. Figures 5; references 6: 3 Russian, 3 Western.

USSR UDC 681.3.51./6.42

ORGANIZING THE INTERFACING BETWEEN MICROCOMPUTERS AND A HOMOGENEOUS MICROELECTRONIC COMPUTER SYSTEM

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 71-77 manuscript received 10 Oct 77; after completion, 17 Feb 78

AVDEYEV, VADIM ALEKSANDROVICH, engineer, TRTI (Taranrog Engineering Institute), Taranrog; KOCHAROV, MIKHAIL ARIVIKOVICH, candidate in technical sciences, Scientific-Research Institute of Instrument Making (Moscow); and MAKAREVICH, OLEG BORISOVICH, candidate in technical sciences, TRTI (Taranrog Engineering Institute), Taranrog

[Abstract] A technique for increasing productivity of computer facilities is considered that is based on combining microcomputers with a homogeneous microelectronic computing system that contains a set of decision elements of a single type in the form of LSI chips. Such systems are classified in four categories: those with fixed structure and commutation; those with fixed commutation and variable structure; those with variable commutation and fixed structure; and those with variable commutation and structure. Each of these classes can be combined with microcomputers to give a different class of microcomputer systems. The authors examine the principles of interfacing microcomputers with a homogeneous microelectronic computing system of parallel-sequential type as the most economic structure in which a set of simultaneously operating decision elements is used for problem solving, but the processing of information in each decision element is bit-by-bit sequential. Estimates are given for the volumes of commutation programs and the times for transferring them from the microcomputer to the commutation system. Figures 7.

USSR UDC 681.3.14/21

A RATIONAL MODEL FOR SIMULATING THE OPERATION OF COMPUTER LOGIC ELEMENTS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 77-82 manuscript received 4 Jan 77; after completion, 3 May 78

SHKLYAR, BORIS SEMENOVICH, engineer, NIIEVM (Scientific-Research Institute of Electronic Computers), Minsk; and LIOKUMOVICH, BORIS YEFIMOVICH, senior scientific research worker, NIIEVM (Scientific-Research Institute of Electronic Computers (Minsk))

[Abstract] The use of modeling in the design of computer hardware requires a large volume of immediate-access memory, considerable expenditures of

machine time and development of an adequate model. In the case of hardware on the logic level, these factors considerably depend on the choice of the model for simulating the operation of the logic elements, and therefore it is advisable to examine construction of a rational model that will reduce modeling time, economize on memory and be conducive to machine compilation of the modeling programs. The authors propose representation of the transfer function of the element in the form of a truth table, which in this case is the functional mathematical model of the element. The left part of the table corresponds to the input variables, and the right side corresponds to the output functions. Simulation of operation of the element as the model works consists in determining the values of the output set Z_j (j=1-d) by sequential search in the table for the truth of the j-th line that coincides with the input set x_j up to the instant when the model begins to work. Characteristics and algorithms are considered for construction of two versions of a model that simulates operation of computer logic elements, and conditions of advisability of using each of them are determined. Expressions are given for comparing the two versions with respect to economy of time and memory. Examples are given of computer-generated subprograms that simulate the operation of IC elements. References 4 (Russian).

USSR UDC 681.306

TABULAR FUNCTIONAL CONVERTERS WITH A LIMITED NUMBER OF STORABLE CONSTANTS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 85-88 manuscript received 16 Dec 76; after completion, 15 Dec 77

MUKHOPAD, YURIY FEDOROVICH, candidate in technical sciences, NEIS (Novosibirsk Electrical Engineering Institute of Communications), Novosibirsk; FEDCHENKO, VALENTINA IOSIFOVNA, engineer, Cybernetics Institute, Academy of Sciences, Ukr SSR, Kiev; and LUKASHENKO, VALENTINA MAKSIMOVNA, engineer, Novosibirsk Electrical Engineering Institute of Communications, Novosibirsk

[Abstract] A method is considered for reducing the dimensions of function tables that is based on representing the function to be realized as a super-position of the code sequence of the input argument transformed with respect to integral powers of two, and correcting constants. This approach to approximation of the function obviates the need for storing values of the functions at nodal points; the values of the correcting functions and conversion factors are stored in the permanent memory, considerably reducing the volume required for realization of function tables. The procedure for calculating a function to be realized consists in determining the ranges of the argument where the function is best

approximated by one of the relations $y=x2^n$, and determining the correcting functions (constants) for the intervals so found. Estimates are given of the accuracy and time of realization of various elementary functions by the proposed technique. Tables 2; references 5 (Russian).

USSR UDC 681.3.05

ON A MATHEMATICAL MODEL OF ANALOG-DIGITAL CONVERSION

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 88-94 manuscript received 8 Dec 77

KONDALEV, ANDREY IVANOVICH, dr in technical sciences, Cybernetics Institute, Academy of Sciences, UkrSSR (Kiev); and LAVRENT'YEV, VASILIY NIKOLAYEVICH, engineer, Cybernetics Institute, Academy of Sciences, UkrSSR (Kiev)

[Abstract] A fairly general mathematical model is proposed for the process of analog-digital conversion. The model is simple and convenient for synthesizing the circuitry of analog-digital converters in a formal way, and is applicable to design of integrated circuits. The analysis is based on a relation for the digital output code in terms of the input analog signal, conversion discreteness and conversion error. By representing the digital equivalent of the analog input in positional notation with a given base, it is shown that conversion reduces to determining the coefficients of the terms in this representation. These coefficients are then determined by a technique for finding the minimum of unimodal functions. Mathematical models synthesized by the proposed method can be used for determining the characteristics of analog-digital converters as well as for design purposes. These models are independent of the nature of the analog signal, and are applicable to both electrical and nonelectrical quantities. Figures 6; references 9 (Russian).

USSR UDC 681.335.4

PRINCIPLES OF DESIGN OF A HARDWARE COMPLEX FOR LOCAL AUTOMATED SYSTEMS FOR MANAGEMENT OF TECHNOLOGICAL PROCESSES

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 95-99 manuscript received 4 Oct 77; after completion, 31 Jan 78

DIDENKO, KONSTANTIN IVANOVICH, candidate in technical sciences, SKB SAU (Special Design Bureau. System of Automatic Management), Khar'kov

[Abstract] An examination is made of the problem of developing a hardware base for present-day automated systems for management of technological processes (ASUTP), and the KTS LIUS equipment complex for local information-management systems is described. The functions to be performed by the complex are listed, and the theoretical and practical problems that had to be solved in the systems approach to development of the complex are discussed. The types of communications interfacing that unify the equipment complex are described, as well as the functional modules and software. The KTS LIUS was exhibited at the Leipzig Fair in the spring of 1973 in conjunction with the Ursadat 4000 equipment developed in East Germany, and won a Gold Medal. Figures 2; references 3 (Russian).

USSR UDC 681.3.48./14

AUTOMATIC ACKNOWLEDGMENT RESPONSES IN A SYSTEM WITH YeS COMPUTER AND VIDEOTON-340

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 132 manuscript received 23 Jun 78

VINNITSKIY, VLADISLAV PETROVICH, candidate in technical sciences, GlavNIVTs (expansion unknown), Gosplan UkrSSR (Kiev); SERGEYEV, ALEKSANDR ALEKSANDROVICH, engineer, GlavNIVTs, Gosplan UkrSSR (Kiev); and LYSENKO, ALEKSANDR YEFIMOVICH, engineer (Kiev)

[Abstract] In a previous article the authors described interfacing of the Videoton-340 video terminal with YeS computers in order to provide man-machine interaction capabilities [see "Upravlyayushchiye mashiny i sistemy," No 1, 1978, pp 132-137]. One disadvantage of the proposed arrangement is the necessity for operator response to reception depending on the presence or absence of errors. The authors now propose a new interface that eliminates this drawback by automating the response when errors are present. Monitoring and acknowledgment may be made either automatic or manual at the user's option by switch settings. Figure 1; reference 1 (Russian).

POLAND

THE USE OF MERA 305 IN DIAGNOSIS AND CHECK OF ANALOG AND DIGITAL MODULES

Warsaw INFORMATYKA in Polish Vol 14 No 1, 1979 pp 16-19

HOJA, JERZY, SZCZYPTA, ANTONI, TLAGA, WALDEMAR and ZIELONKO, ROMUALD; Institute of Electronic Technology, Gdansk Polytechnic

[Abstract] The tendency toward modularization of electronic devices and new technologies for the assembly of modules, currently called packages, requires the use of automated methods for testing and diagnosis of their properties. A manual search for defects in analog systems is a complex and labor-consuming process requiring highly qualified personnel, and consequently it is difficult to automate it by conventional methods. New technologies, especially the use of integrated and multilayer printed circuits, altogether exclude manual diagnosis and make its automation a necessity. These reasons caused the Institute of Electronic Technology of the Gdansk Polytechnic to undertake research on automation of testing and diagnosis of electronic circuits. As a result of this research the system described has been suggested. The system in question was developed at the request of the Teleelectronical Establishments TELFA in Bydgoszcz. The architecture of the system is illustrated by a block diagram presented in the article, and the system is controlled by a minicomputer MERA 305 equipped with a disk memory unit. The measuring part of the system comprises two channels: 1) An analog channel permitting functional measurements and diagnosis of analog and analog-digital packages; and 2) A digital channel, which makes it possible to test digital packages. The analog packages are connected with the system by means of contact points, and digital packages by natural joints. Both channels can operate alternately. In the field of functional measurements the analog channel permits measuring of the frequency characteristics in the acoustic band, the attenuation of transitions, time constants, frequencies, and answers of the circuit to sequences of pulse stimulations. In the domain of diagnosis, the analog channel makes possible a complete localization and identification of malfunction at the level of individual elements. Diagnosis of investigated circuits is realized by a direct measurement of its component elements (R, L, C, transistors, diodes, low-frequency integrated circuits), the measurement of voltage at circuit nodes and checking shortings between tracks. Measuring operations are described, and the difficulties encountered and solved explained (cf: Zielonko, R., Hoja, J., Wojciechowski, H.: Method of Breaking Electric Networks for Measurement of Parameters of Network Components. United States Patent 3927368). The digital channel is intended for checking digital packages, realized by one of the following techniques: TTL (+5V) and thick-layer circuits GMC-10 (+18V) and E-100H (+24V). This channel permits checking of the accuracy of operation of combinational and sequential logic nets supplied by nominal and marginal voltage +5V $\pm$ 5 percent, +24V $\pm$ 10 percent. Operation of the digital

channel is described. The control unit, the interface, and the software of the system are also described in detail. The system was introduced at the Teleelectronical Establishments TELFA, where it operates two production lines of analog and digital packages. Engr. Jerzy Hoja, M.A., graduate of the Department of Electronics, Gdansk Polytechnic (1970). Since 1970 has worked at the Institute of Electronic Technology, Gdansk Polytechnic. He deals with design and implementation of measuring and diagnostic computer systems. Engr. Antoni Szczypta, M.A., graduate of the Department of Electronics, Gdansk Polytechnic (1972). Since 1972 has worked at the Institute of Electronic Technology, Gdansk Polytechnic. He deals with design and implementation of measuring and diagnostic computer systems. Eng. Waldemar Tlaga, M.A., graduate of the Department of Electronics, Gdansk Polytechnic (1973). Since 1973 has worked at the Institute of Electronic Technology, Gdansk Polytechnic. He deals with design and programming of measuring and diagnostic computer systems. Docent, dr., engr. Romuald Zielonko, director of the Department of Electronic Measurements, Institute of Electronic Technology, Gdansk Polytechnic. He deals with computer measuring techniques. Figures 3.

C. Programming and Software

Abstracts of Articles

USSR UDC 681.3.06

THE KROS SCHEDULING SUBSYSTEM

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 26-29 manuscript received 19 May 78

KONDRAT'YEVA, TAT'YANA VLADIMIROVNA, engineer (Kazan'); PETROVA, TAT'YANA ALEKSANDROVNA, engineer (Kazan'); ROKHLIN, FELIKS ZALMANOVICH, candidate in technical sciences (Kazan'); and FISHMAN, NAUM KIVOVICH, engineer, Kiev PKB ASU (Planning and Design Bureau, Automated Management System (Kiev)

[Abstract] The paper describes the KROS planning subsystem that is used in conjunction with the YeS operating system (OS). The KROS subsystem is an expansion of the OS control program, and has been developed to increase the productivity of the computing system under control of the OS in the multiprogramming mode with a fixed or variable number of jobs. In addition, the KROS subsystem offers capabilities for program development and organization of the computing process. This applied program package forms a superstructure over the OS control program, enabling it to analyze all demands on the I/O supervisor of the OS and to control the input flows of assignments and system output data. The working efficiency of the control program is enhanced by two new access methods. The first method offers the capability of reducing the number of OS provisional data sets, compact arrangement of data sets of the input flow and system output, and greater speed in storage and retrieval of these data sets. The second access method is designed for more efficiency in organizing remote input of assignments from local shops and distant computers with output of the results of execution either at the input point or some other specified point. The operation of the KROS scheduling subsystem is described. Experimental verification shows a 30 percent improvement in traffic-handling ability of the computer system. Work is now in progress on perfecting the KROS subsystem. References 3 (Russian).

USSR UDC 681.3.06.62/029

A THREE-LEVEL METHOD OF DISPLAYING GRAPHIC DATA

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 30-33 manuscript received 31 May 78

KULINKOVICH, ARNOL'D YEVGEN'YEVICH, dr in technical sciences, Cybernetics Institute, Academy of Sciences, UkrSSR (Kiev); and GUMENYUK, ALEKSANDR IVANOVICH, graduate student, Cybernetics Institute, Academy of Sciences, UkrSSR (Kiev)

[Abstract] In interactive graphic display systems with editing capability, an important part is played by the facilities for data output to the display screen. There are two known methods of doing this: the method of graphic macrocommands and the method of graphic expansion of programming languages. The former consists in creating a package of graphic subprograms in a given programming language (such as FORTRAN), while in the latter method the syntax of the programming language is expanded so that the operations of representation of graphic data are described in the most compact way. In this paper the authors propose a three-level method of graphic data display that enables the programmer to construct the image by organizing procedures based on the use of ready-made complexes rather than by sequential access to procedures that describe the graphic complexes. In addition to graphic elements and complexes of elements, classes of complexes (macroelements) can also be used in image construction. The macroelements are described by a set of built-in (standard) macroelement procedures. Figures 1; references 5: 2 Russian, 3 Western.

USSR UDC 681.3.06.51

SOFTWARE METASYSTEM OF AUTOMATED SYSTEM FOR MANAGEMENT OF TECHNOLOGICAL PROCESSES

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 37-43 manuscript received 16 Feb 78

DAVIDENKO, KONSTANTIN YAKOVLEVICH, candidate in technical sciences (Moscow); SEMENOVA, YELENA PETROVNA, senior scientific research worker (Moscow); and KRASNOVA, GALINA ANTONOVA, junior research worker (Moscow)

[Abstract] The authors describe a real-time automated programming system (ASP RV) of parametric type developed in recent years at the Central Scientific-Research Institute of Large-Scale Automation. The proposed

software metasystem realizes the functions of a standard automated system for management of technological processes (ASUTP). The programming system is based on a systems approach, i.e., the ASUTP is treated as some closed (formal) system rather than as a simple set of jobs. The metasystem is developed as a monolithic program complex that is adjustable with respect to parameters. Provision is made for adaptation and development of algorithms of monitoring and control of a specific system during the stage of operation. The stages in setting up the metasystem are described. The problem of flexibility, i.e., the capability for rapid transfer of the system without losing effectiveness, is considered important because of the state of flux in the area of computerized process management. For instance, M6000 computers are being put into operation on a large scale at the same time that series production has begun on the M7000, series SM computer complexes are being produced, and the outlook is promising for introduction of microcomputers. To ensure flexibility of the ASP RV system, high-level languages (specifically FORTRAN) are used in programming translators, and an internal machine-independent language is provided. Although only the second measure has been fully realized in the development to date, assembler programs make up no more than ten percent by volume of the total. The ASP RV metasystem is made up of three sections: an invariable section (processors), a section that rarely changes (data base, library of operational modules), and a section that is being constantly updated (operational information on the course of the technological process). These sections are particularly compatible with the permanent, semipermanent and dynamic storage of a microcomputer. An important point in this regard is the small volume of processors that operate in real time and require assembler programming. On the other hand, the structure of the input program with division into situations and jobs makes it easy to parallel the work among separate computers, achieving total compatibility between the structure of technological equipment, computer hardware and software. The basic concepts of the system have been experimentally confirmed. Nevertheless, the real-time requirement has raised certain problems in the operational adjustment stage. At present the system incorporates internal mechanisms for organizing the computational process. While this relieves the user of the need for a detailed description of the operational environment, it leaves organization of the computing process somewhat arbitrary, which is not always admissible. This makes it necessary to complicate the initial process control system and to expand the input language. Herein lies the direction of further work on the ASP RV metasystem. The system has now been developed to the point of realization of a working model based on the M4030 computer, containing all elements except the compiler of the operating section. Programming of this part is now in progress on the level of commands of a syntactic processor in the form of an abstract machine. At present the real-time processors are being converted to the M6000 computer with a disk operating system. Several fairly large-volume jobs (up to 2000 instructions of the input language) taken from specific ASUTP have already been done on the model system. Figures 4; references 9: 8 Russian, 1 Western.

USSR UDC 681.3.01:007

A PROBLEM-ORIENTED PROGRAM PACKAGE FOR HANDLING COMBINATORIAL OPTIMIZATION JOBS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 43-47 manuscript received 17 May 78; after completion, 3 Jul 78

GULYANITSKIY, LEONID FEDOROVICH, junior research worker, Cybernetics Institute, Academy of Sciences, UkrSSR (Kiev); KASPSHITSKAYA, MARIYA FADEYEVNA, candidate in physicomathematical sciences, Cybernetics Institute, Academy of Sciences, UkrSSR; SERGIYENKO, IVAN VISIL'YEVICH, corresponding member, Academy of Sciences, UkrSSR Academy of Sciences, Cybernetics Institute, AS, UkrSSR (Kiev); STIRANKA, ANNA IVANOVNA, candidate in technical sciences, Cybernetics Institute, AS UkrSSR (Kiev); and KHILCHENKO, VALENTINA IOSIFOVNA, engineer, Cybernetics Institute, AS UkrSSR (Kiev)

[Abstract] The authors consider some particulars of the organization and operation of the VEKTOR-1 program package designed for solving certain optimization problems of combinatorial type that belong to one of the following classes: Class I--problems of arranging computer components on a discrete field of positions; II--problems of optimum partitioning (packaging) of a set of problems into groups according to certain features; III--optimization problems of planning the computational process in applied package programs and automated management systems; and IV--problems of the type of schedule compilation for multiprocessor computer systems. Particular attention is given to questions of problem solving in the dialog (interactive) mode. A mathematical model of an important type of optimization problem is discussed, and some results of the solution of practical problems are given. The authors thank N. K. Timofeyeva of the Elektronmash Production Association for preparing data relating to hand layout and drawing. Tables 1; references 10 (Russian).

USSR UDC 62-52:681.3.06.44

BASIC PRINCIPLES OF DESIGN OF THE STOP-2 MULTITELEACCESS SYSTEM FOR PREPARING THE CONTROL PROGRAMS FOR MACHINE TOOLS WITH NUMERICAL PRESET CONTROL ON YeS COMPUTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 48-51 manuscript received 20 Mar 78; after completion, 17 Apr 78

STEPANOV, PETR LEONIDOVICH, candidate in technical sciences, Tomsk Polytechnical Institute (Tomsk)

[Abstract] The article describes the Stop-2 automated system for preparing machine-tool programs on the YeS computers. The system was designed on the basis of the following assumptions: 1--The user must be able to work with the computer in the interactive mode both on the procedure level and on the level of user formulation of various local goals; 2--The system must be organized for time-sharing or multiprogramming; 3--User teleaccess to the computer must be provided; and 4--The level of automation must be maximized in calculating control programs. Requirements for the input language, translator and organization of the operation of the system are considered. The hardware of the system includes only series-produced devices and YeS computers of at least class YeS-1022. References 7: 4 Russian, 3 Western.

USSR UDC 681.3.06.47

INPUT/OUTPUT FACILITIES IN THE COBOL STANDARD

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 51-54 manuscript received 5 Mar 78

ZAGUZOVA, LIDIYA KONSTANTINOVNA, engineer, NIIEVM (Scientific-Research Institute of Electronic Computers), Minsk; and ROMANOVSKAYA, LORINA MIKHAYLOVNA, engineer, NIIEVM (Scientific-Research Institute of Electronic Computers), Minsk

[Abstract] In contrast to the traditional classification of input/output facilities according to access method, the COBOL standard [All-Union State Standard GOST 22558-77] classifies these facilities by file organization method: sequential, relative-address and indexing. The file organization in turn dictates the access methods: sequential, random and dynamic. Sequential files are organized so that each item except the first has a unique predecessor, and each item except the last has a unique successor.

They can be accommodated on any data media. In a relative-address file, each item is identified by a positive integer that indicates the relative position. The indexing file is one in which each item is identified by a key tag. Relative-address and indexing files must be recorded on media with random access. Sequential access is applicable to files with any organization. In the case of a sequential file, the items become accessible in the order of location in the file. In the case of an indexing file, the items are available in order of increasing key tags, and in a relative-address file the items become accessible in increasing sequence of their relative numbers. Sequential retrieval from relative and indexing files can start with any item. Random and dynamic access are applicable only to relative and indexing files. In random access the programmer determines the order of retrieval, and dynamic access is used where sequential and random access must alternate. File processing operations and I/O operators are described. Differences are pointed out between I/O facilities in the COBOL standard and COBOL versions for YeS computers. On the whole, the set of I/O facilities in the COBOL standard gives a more logically structured system than in former COBOL versions, and extends the possibilities for controlling organization and access to data in COBOL programs.

USSR UDC 681.3.06:51

CONCERNING APPLICABILITY OF ONE ALGORITHM TO SOLUTION OF THE PACKING PROBLEM

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 55-56 manuscript received 27 May 77

SABAYEV, ALEKSANDR ALEKSANDROVICH, junior research worker (Leningrad)

[Abstract] The author considers the packing problem that arises in optimizing data distribution in computer memories. It is proposed that a modification of the method of branches and boundaries be used to solve this problem. A mathematical model of the optimization problem is formulated as a combinatorial problem in discrete programming, and it is shown that the proposed algorithm gives the optimum value of the criterion functional. A computer check of the procedure confirmed applicability to solution of packing problems and showed the efficiency and decided advantages of the algorithm over conventional methods. Tables 2; references 5 (Russian).

USSR UDC 681.3.51.6.42

THE PROBLEM OF DETERMINING THE PROBABILITY CHARACTERISTICS OF THE TIME OF EXECUTION OF COMPUTER PROGRAMS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 57-60 manuscript received 11 Jun 78

GOLOVKIN, BORIS ARKAD'YEVICH, dr in technical sciences (Moscow)

[Abstract] Computational and modeling methods are considered for determining the probability characteristics of computer running time. It is shown that labor inputs in both cases can be considerably reduced by using graph theory to set up a preliminary model of the investigated program as a rational form of machine representation of initial data. A comparative analysis is made of the technique as applied to analytical and Monte Carlo methods. It is shown that both methods require the same kinds of labor inputs of about the same difficulty, the analytical methods having the advantage from the standpoint of expenditure of machine time. Numerical calculation gives the exact mathematical expectation and variance of the time of execution of investigated programs, while the distribution of probabilities of this time is exact for acyclic programs and truncated for cyclic programs. In the case of Monte Carlo techniques all characteristics are determined approximately, and it is difficult to evaluate accuracy. References 16: 11 Russian, 5 Western.

USSR UDC 681.326.32.00

TWO PROBLEMS IN INDIRECT CODING OF MICROCOMMANDS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 82-84 manuscript received 6 May 78

BELITSKIY, ROBERT IZRAILEVICH, engineer, Cybernetics Institute, Academy of Sciences, UkrSSR; and SYROV, VIKTOR VALENTINOVICH, engineer, SKB MMS IK AN USSR (Special Design Bureau, Mathematical Machines and Systems, Cybernetics Institute, Academy of Sciences, UkrSSR), Kiev

[Abstract] The use of indirect coding can reduce the word length of microcommands by a factor of two or three as compared with direct coding, which is a distinct advantage in designing microprogramming control devices. An approach is considered for indirect coding of microcommands that is based on synthesizing a generalized format by using the informational redundancy of formats that arise in coding the fields of compatible microoperations. The reason for this redundancy is that not all fields are used

in every microcommand, i.e., some of them indicate empty micro-operations. The resultant generalized format accounts for all peculiarities of the mutual relation between micro-operations and microcommands. Two problems of indirect coding are considered that can be solved as problems of pseudoboolean programming: synthesis of classes of compatibility of micro-operations that enable coding of a system of microcommands with the minimum number of bits, and partition of all microcommands of the system into nonintersecting classes. Figures 2; references 6: 4 Russian, 2 Western.

USSR UDC 681.3.06./14

THE BASCAL REAL-TIME LANGUAGE FOR PROGRAMMING CAMAC SYSTEMS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 110-115 manuscript received 11 Apr 78; after completion, 13 Jun 78

VINOGRADOV, VYACHESLAV IVANOVICH, candidate in technical sciences, IYaI (expansion unknown), Academy of Sciences, USSR (Moscow); and ROSLYAKOV, ALEKSANDR DMITRIYEVICH, engineer, IYaI, Academy of Sciences, USSR (Moscow)

[Abstract] The paper gives an informal description of BASCAL (BASic-CAmac Language), which is a syntactic expansion of the punch-tape version of BASIC implemented by intermediate-level CAMAC programming operators. The functional completeness of the expansion corresponds to the IML specification, and the syntax is simplified. In addition, a real-time function is introduced as well as a number of service capabilities corresponding to the real-time BASIC specification. The expansion is realized in such a way that complete BASIC-BASCAL program compatibility is preserved. The translator is written for class PDP-11 minicomputers. The software and syntax of the expansion are explained, and the basic, modular, conditional and systems operations are described. The system is suitable for operations on all computers that have a command structure compatible with PDP-11 class computers, including the Soviet machines SM-3, SM-4 and computers of the Elektronika series. Figures 2; references 4: 1 Russian, 3 Western.

D. Automated Design and Engineering

Abstracts of Articles

USSR UDC 62-52.001.2

FORMAL DESIGNING BASED ON THE CLUSTER COMPLEX OF ELECTRICAL REGULATION EQUIPMENT

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1979 pp 16-17

SHAL'MAN, L. M., candidate in technical sciences

[Abstract] Broad use of model design solutions (TPR), methods of formal designing (FP) and methods of design layout (PK) characterize automated regulation system (ASR) designing today. TPR make use of common tasks that are fully worked out and tested in several objects. Two conditions are needed for TPR--the availability of standard control algorithms and the assumption that the material basis of TPR must be series manufacturing of equipment guaranteed for extended periods: particularly, the cluster complex of electrical regulation equipment (AKESR), for the GSP (State System of Industrial Instruments and Automation Devices), in microelectronic execution. From among the dozens of ASR in different industries, the following standard control algorithms can be distinguished: forming the control goal; collecting and processing information about the controlled process; comparing the control goal with current information about the controlled process and then forming the controlling signal; and forming an action on the controlled process. Under this classification, four systematically reproduced components of the so-called systems modules (SM) can be listed: modules forming the set-point signal (MFSZ), the information signal (MFIS), the control law (MFZR) and the action on the controlled process MFVP. System modules that are the most common in automated regulation systems are referred to as model system modules (TSM). As to formal designing (FP), the following sequence of operations is involved: comparative analysis of elements of the given structure of the ASR with the set of TPR; selection of the TPR that handle the proposed functional task; and synthesis of a system under a given designing algorithm from among the selected TPR. These operations lead to the making of

functional and schematic electrical diagrams of the ASR. Model design solutions are collected in albums of TSM and TFN [model functional sets]. A set of documentation for each of the system modules developed in the NIIteplopribor [Scientific-Research Institute of Heat and Power Instrument Building] consists of a functional diagram which determines the main processes occurring in a given module, and schematics showing the full makeup of the AKESR blocks and their interconnections within the SM for cabinet and instrumental modifications. Figures 6; references 2 (Russian).

USSR UDC 681.3.06./91

ON SELECTING THE STRUCTURE OF AN INTERACTIVE GRAPHIC DESIGNING SYSTEM

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 100-105 manuscript received 23 Jun 78

ZABARA, STANISLAV SERGEYEVICH, candidate in technical sciences, PO (production association) "Elektronmash" (Kiev)

[Abstract] An interactive system for automated design is described in which priority is given to printed circuits as the bulkiest and most labor-consuming design projects. The problems that are handled by the interactive system are broken down into two classes. In the first class are problems of design synthesis: placement of elements of various sizes on the circuit board with consideration of their geometric characteristics and connectedness among them, routing of connections with step-by-step manual or machine methods of synthesis, making plan documentation with consideration of requirements for clear representation and so on. The second class of problems includes so-called routine jobs in which the stage of synthesis is handled outside of the system. These jobs involve simpler transformations of graphic information, but considerably larger volumes. The editing stage is described. Two different versions of interactive graphic systems are considered: individual-user systems based on minicomputers, and time-shared systems. Figures 2; tables 1; references 9: 7 Russian, 2 Western.

USSR UDC 621.9.02:681.3.06

ORGANIZING OPERATIONAL GRAPHICS INTERACTION OF TOOL DESIGNER WITH COMPUTER

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1979 pp 36-37

VINOKUROVA, V. I., engineer

[Abstract] The mode of closed designer access to a computer is the most common mode of computer-aided problem solving. Cutting tools, for example, are designed under this system in three stages: data input, multivariant calculation of cutting profile and documentation of results. Drawbacks in this mode including the impossibility of automating the design steps. In contrast, the mode of operational graphics interaction of an operator with computer eliminates these drawbacks. The terminal at which the designer works can have a display, light pen, function keyboard (FK), alphanumeric keyboard (ATsK), plotting board, x-y arm and so on. The interactive designing program is made up of a controlling part--an interactive monitor and procedures implementing the formalized design stages. Organizing the operational graphics designing of instruments consists of: determining the times of human interaction with a computer during designing; developing an arrangement for operational graphics interaction--a sequence of actions with which the designer tells the computer his intentions, and images with which the computer replies to the individual; determining the set of designer commands and the methods of their implementation; and developing the interactive monitor. The times of human interaction with the computer include: data input stage, n calculation stages after each of which human intervention in computer process is desirable, and the results documentation stage. As to the interactive monitor, it determines the admissible human actions in each program state of expectation. An expectation state is a state when the computer offers the person the opportunity of controlling the designing process, by limiting his freedom to selecting the commands possible for the given state. Figures 2; references 2: 1 Russian, 1 Western.

II. ECONOMIC APPLICATIONS

A. General Treatment

Translations of Articles

MEASUREMENT TECHNOLOGY, AND THE AUTOMATION OF MONITORING AND CONTROL

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1979 pp 44-45

[Text] An exhibit with this title is in pavilion 3 of the interdisciplinary exhibits at the Exhibition of Achievement of the National Economy of the USSR. Its organizers are the USSR State Committee for Standards, the Ministry for Instrument-Making, Automation Equipment, and Control Systems, and the USSR Academy of Sciences.

Over 1,500 full-scale samples, including complex instruments, are exhibited by nearly 300 production associations, enterprises, and scientific-research and design-construction organizations of 28 ministries and administrations.

In the 5 sections of the exhibit, located on 4 floors, achievements of Soviet metrology and instrument-making are being demonstrated. The visitor to the exposition becomes well acquainted with the standards base of the country, with exemplary means of measurement, and with integrated and mobile calibration laboratories. Here are shown devices and methods of transferring the dimensions of units from primary standard to secondary standard and, then, to the working measuring devices.

Considerable space at the exposition is devoted to the measurements of electrical and magnetic quantities: Determining current strength, electrical potential, resistance, inductivity, capacitance, magnetic inductance, magnetic current, magnetic moment, relative dielectric permeability, the coefficient of the standing potential wave, the coefficient of amplitude modulation, nonlinear distortions, frequency deviation of frequency-modulated oscillations, spectral power of radio noise emission, power of electromagnetic oscillations in coaxial and waveguide circuits.

On the display stands, visitors can find high-precision digital voltmeters, among them the Shch-48,000 voltmeter and working digital instruments of the F-212 series as well as reference devices for measurements in the area of high voltages and heavy currents. Widely represented are digital devices for measuring resistance and capacitance.

Standard samples (measurements) of magnetic properties of materials and instruments for the measurment of magnetic quantities are also demonstrated. The steps in creating systems of standards for electrical quantities, which are based on the use of natural constants, which results in increasing the precision of measuring electrical and magnetic quantities by 3- to 10-fold, are traced.

The state system of industrial instruments and automation equipment (GSP) reflects the achievements of the national instrument-making industry in developing integrated technical devices to be used in the national economy for automating production. How use is made of the progressive principle of a systems approach to the creation of a technological base for automating production, which permits cost-effective and optimum development of automation devices, is shown. The exhibits include all functional groups of products from the GSP, among their number the complex of sensors for thermal energy process parameters (pressure, flow rate, level, temperature). An integrated electrical control complex and the integrated functional equipment complex of the "Tsentr" pneumatic devices are shown also, as are a number of electrical slave mechanisms. Full-scale samples of several systems that span the electrical, pneumatic, and hydraulic branches of the GSP are shown.

The broad assortment of standardized construction types, from the simplest elements to instrumentation racks and consoles, represents the technological base of integrated GSP equipment.

The exhibit reflects the scope of work done in creating such systems, whose number is expected to double in the 10th Five-Year Plan, with more than 30 percent of the automated systems for the management of technological processes (ASUTP) based on third-generation digital computers. Visitors receive information on the development of the prime examples of automated systems for the management of technological processes in the most important branches of the national economy, such as automated management systems for oxygen-converter plants, powerful rolling mills, blast furnace enterprises, automated systems for the management of technological processes of atomic and thermal powerplants, installations for the production of high-grade ethylene, and those for ammonia and primary oil.

Digital computers intended for serving practically all spheres of human activity are broadly represented. There are demonstrations of the SM-1 control computer set, which is used in automated systems of management of assemblies, technological processes and production, experimental research

sets, for initial processing of results of research with complex equipment, and for data from geological explorations and from medical-biological research. It is also used in information retrieval systems, and so forth, while the PS-300 computer is used in similar but reprogrammable systems. Electronic key-actuated computers, electronic bookkeeping machines, and electronic control-recording machines are also shown.

The exhibit is of interest also because it shows achievements in the area of creating microprocessors, microcomputers, and microcircuits used in series-produced instruments. Series-produced microprocessors are demonstrated, as well as computers based on using these microprocessors, standardized amplifiers using integrated microcircuits and microelectronic logic modules of medium-scale integration, and stabilized power supplies and other products of micro- and optoelectronics.

The successful implementation of the program for developing and introducing an integrated branch system for controlling production quality of the Ministry of Instrument-Making Automation Equipment and Control Systems will permit a substantial increase in the technical level of machine construction products during the current 5-Year Plan and will assure the necessary growth rate in production volume. It is planned to overhaul about 60 percent of the production items during the current 5-Year Plan and to raise to the 40-percent level the fraction of products awarded the government seal of quality.

Industrial esthetics and ergonomics are playing an ever-expanding role in instrument-making. One becomes convinced of this by examining several samples. In their number are those electronic instruments developed by the Institute for Electronic Control Machines with the participation of artist-designers from the All-Union Scientific-Research Institute for Industrial Esthetics. Unity of design and style was achieved in the equipment, thanks to the proposed technical, biotechnical, and esthetic solutions. Integrated electromeasurement instruments incorporating consideration for the most recent achievements of design esthetics are also shown at the exhibition.

Demonstrations of devices for studying the humidity and temperature fields in environmental chambers and in the "Snezhinka" thermal test chamber are included in the exhibit, as are hydrostats, hygrometers, potentiostats, and devices for monitoring the thickness of coatings.

A large segment of the exposition is devoted to examples of the state service for time and frequency, such as special, highly precise time devices and clocks widely used in industry, agriculture, and commerce.

The exposition acquaints one with various types of model and working flowmeters and counters whose application makes possible metrological support to workers using flowmeters under field conditions.

The weight-measuring technology used in many branches of the national economy is demonstrated. Represented are current designs of electronic commercial and other working scales and designs with digital indication and record-keeping of mass, price, and value of weighed and packaged goods, showing examples of scale of first-class quality with ranges of measurements from 200 grams to 20 kg and sample electrotensiometric scales for checking beam scales with measurement ranges of 500 $\pm$ 50 kg and permissible errors of $\pm$ 0.02 percent.

The exposition reflects current achievements of enterprises and organizations and of ministries and administrations in the area of automating measurement, monitoring, and control. Over 250 examples tell the story of successes in developing products for general purpose and control computing systems and means for logging and transmitting information for automated systems of controlling technological processes.

Broadly represented are devices for nondestructive quality testing of materials and products, in particular, the small portable instruments MT-30N, MT-400NTs, and VT50-N for monitoring thickness of materials and of galvanized, lacquer, and rubber-bituminous coatings of products of ferrous and nonferrous metals.

The electronics industry uses the very finest instruments and equipment based on the latest achievements in physics, such as laser beams, electronics, and atomic beams under conditions of deep vacuum, and so forth, in its technological processes. The exposition includes more than 60 instruments used in the process of creating and testing microelectronic products. Equipment for scientific research is also among the exhibits: Spherical and cylindrical spectrometers, a facility for molecular epitaxy, scanning electron microscopes, ellipsometers, and so forth. Devices for measuring the parameters of electronic technology are most completely shown, among which are the IIS-4 set for testing integrated circuits and the L2-61 IMS meter.

The roles of metrology and measurement technology in agriculture are thoroughly represented at the exhibition. The exhibits are constructed in accordance with the program for metrological support to agriculture, designed with the goal of providing the necessary precision and reliability of measurement and monitoring of parameters of quality and quantity in the production of agricultural products. Shown are portable and reliable devices for measuring soil humidity, devices for ultraviolet irradiation of livestock and for illumination of livestock barns, a field laboratory for the selection of samples from feeds, a transportable agrochemical laboratory, and standard samples for the composition and properties of soils, plant materials, fertilizers, pesticides, and so forth.

A separate section is devoted to monitoring the environment: Instruments for measuring water pollution, gas analyzers for monitoring the atmosphere

and automobile exhausts, and other similar instruments. For the analysis of complex mixtures (such as waste water or heavily polluted atmosphere), wide use is made of a universal instrument, the chromatograph. In measuring the pollution of large masses of air and water, ever-increasing use is made of devices based on the application of optical quantum generators. This is also reflected in the exhibits.

In the public health section, demonstrations of diagnostic medical technology using automated initial processing of measurement information and laboratory measurement technology, including instruments for the sanitary-hygenic service for protecting the environment (the ASI-1, the first ionometer of domestic production, a number of dosimeters for ionizing radiation) are made. A program of metrological service for public health is also presented, showing the prospect for development in this area for the next 5 to 10 years.

Visitors to the exhibition can become acquainted with the essence and measurements of rapidly flowing processes, with devices for recording space-time characteristics of these processes, created on the basis of using electronic-optical and photoelectrical transducers, wideband and long-persistence cathode-ray tubes. They can be used to study electrical discharges in gases, explosive processes, high-temperature plasma, laser radiation, and so forth. Among the exhibits is an electronic-optical transducer intended for photo detection of spectra of weakly radiating astronomical objects consisting of a GGBTs-7 wideband cathode-ray tube for measuring one-time signals of subnanosecond duration.

But the exhibition is not just an inspection of scientific-technical achievements in the branches of metrology, measurement technology, and automation of monitoring and control. By rights, it should be called the university of technical knowledge and first-order experience. All-Union and international conferences, meetings, seminars, consultations, days for workers of special branches and schools with advanced know-how are taking place based on its exhibits. Services to the visitors include automated information for search and display of data about the full-scale samples demonstrated at the exhibition, operating standards, and standard technical documents. The exhibition will run until 20 April 1979.

6948
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Abstracts of Articles

USSR UDC 62-52:681.3.06.44

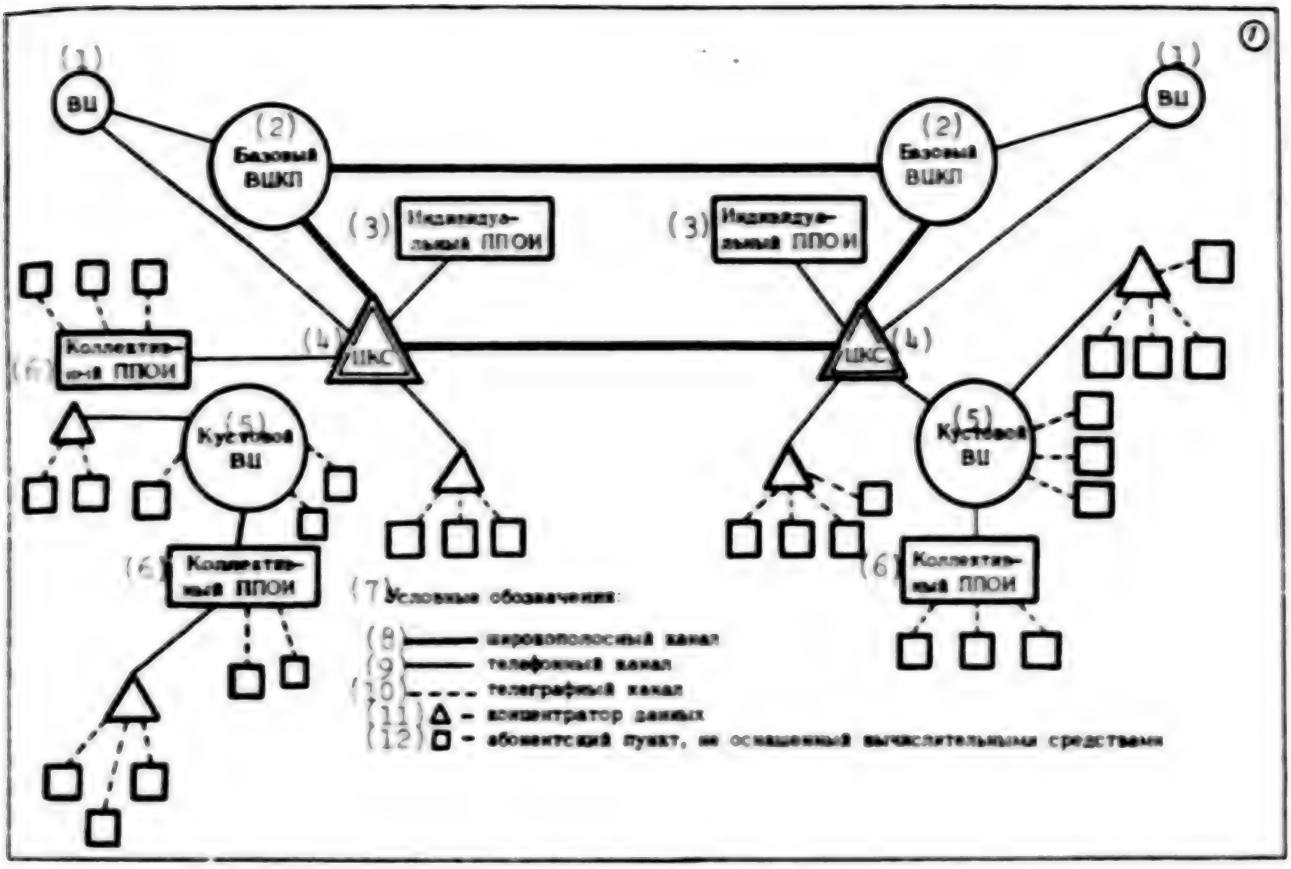
STRUCTURE OF THE STATE NETWORK OF COMPUTING CENTERS AND COMPLEX OF MATHEMATICAL MODELS FOR DETERMINING ITS MAJOR TECHNICAL CHARACTERISTICS AND TERRITORIAL DISTRIBUTION

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 3-8 manuscript received 9 Mar 77; after completion, 3 Aug 78

MAKSIMENKO, VITALIY IVANOVICH, dr in economic sciences, Glavnoye upravl. VT i SU GKNT SM SSSR (Main Administration, VT and SU (expansion unknown), State Committee for Science and Technology, Council of Ministers, USSR); and BRATUKHIN, PAVEL IVANOVICH, candidate in technical sciences, VNIIPOU (expansion unknown), Moscow

[Abstract] The article describes the organization of the Soviet State Network of Computing Centers (GSVTs). Hardware is considered in the following four divisions: 1--Computer facilities; 2--Automatic data banks; 3--Terminal equipment; 4--Data transmission facilities. Hierarchical structures are discussed for each of these hardware groups. Computer facilities are subdivided into individual and collective-user computing centers. The multiple-user centers are further broken down into base centers that serve users regardless of territorial or departmental affiliations, and branch centers for users in given territories and agencies. The base multiple-user computing centers are interconnected by wide-band communication lines and form the nucleus of the State Network. They handle interdepartmental planning problems, complex technical jobs requiring large data files and interaction of widely separated users, and also management problems. The branch multiple-user centers and individual computing centers can be considered as generalized subscribers with respect to the core of the State Network. A separate group is formed by computing centers equipped with specialized minicomputers, which are called preliminary data processing points, and may be either of the individual or collective-user type. Facilities for storage of information blocks are a component part of a distributed automatic data bank, and by analogy with computer facilities are subdivided into individual and multiple-user

facilities located at base, branch and individual-user centers and preliminary data processing points. The terminals range from low-speed teletypes to sophisticated minicomputer-display units. The data transmission facilities are subdivided into intercentral and subscriber equipment. The intercentral data transmission network supports operation of the nucleus of the State System, while the subscriber network connects system users with one another and with computer facilities of all types. The traffic handling capacity of the data transmission facilities used in the system ranges from 50 to 48,000 bits/s. The structure of the hardware of the Soviet State Network of Computing Centers is shown schematically in the figure. Territorially, the hardware components of the Network are subdivided into concentrated facilities (network junctions) and distributed facilities (the channels connecting the junctions). The junctions are data concentrators, message commutation centers, base collective-user computing centers, automated data banks and local shops. The distributed facilities of the Network include subscriber and intercentral communication channels. The problem of selection and territorial distribution of the major hardware elements of the State Network is discussed, and the structure of the complex of mathematical models for determining the technical characteristics and territorial placement of facilities is outlined. These models are classified in four groups: 1--Preparation of initial data; 2--Territorial placement and major characteristics of the network; 3--Operational characteristics of the network; and 4--Dynamics of territorial development and growth of capacity of the network. Figures 2; references 2 (Russian).



KEY:

1--individual computing center
2--base collective-user computing center
3--individual preliminary data processing point
4--message commutation center
5--branch multiple-user computing center
6--collective-user preliminary data processing point
7--symbols
8--wide-band channel
9--telephone channel
10--telegraph channel
11--data concentrator
12--local shop without in-house computer facilities

USSR UDC 621.397:681.322

DYNAMIC PROBLEM OF CONTROLLING THE PROCESS OF DEVELOPMENT OF A NETWORK OF COMPUTING CENTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 8-12 manuscript received 26 Nov 77; after completion, 23 Aug 78

ZAYCHENKO, YURIY PETROVICH, candidate in technical sciences KPI (Kiev Polytechnical Institute), Kiev

[Abstract] The article presents a formalization of the problem of multi-stage planning of the development of a network of computing centers, and outlines engineering methods of solving the problem based on this formalization. The dynamic problem of controlling the process of development of the network of computing centers is formulated, and two versions of the problem are considered: 1--The distribution of overall capital outlays by individual stages of introduction is given, and it is required to set up a developmental plan that maximizes a criterion functional with consideration of specific limitations; 2--The total sum of capital investments for developing the entire network is given, and it is required to distribute expenditures by stages of development (of an unknown number in the general case) so as to maximize a criterion functional. The algorithms proposed for solving these problems enable efficient planning of a developing network by maximizing the increment in productivity at each stage. Incorporated into these algorithms is the capability for extending the process of development of the network topology to any number of stages as the needs of subscribers increase. Experiments confirm the feasibility of using the given methods and programs for solving dynamic problems in the design of networks of computing centers. References 6 (Russian).

B. Economic Control at National Level

Translations of Articles

UDC 658.012.011

NEW METHOD FOR DETERMINING ECONOMIC BENEFITS

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 3, 1979 p 41

[Article by the head of the All-Union association "Soyuzsistemprom", B. V. Karpov, and by dr of economic sciences I. A. Kruchinin: "New Sector (otrasl') Methodology for Determining the Economic Benefits From an ASUP (Automated Enterprise Management System)"]

[Text] The "sector methodological directives for determining economic benefits to be derived from automated management systems for enterprises and production associations of the instrument-making industry" have been newly worked out by the All-Union association, "Soyuzsistemprom," in agreement with the USSR State Committee for Science and Technology and with Gosplan of the USSR, and have been in effect since 1 July 1977.

Together with the evaluation of the overall system effect of the operation of the automated enterprise management system (ASUP), the new methodology generally requires that particular attention be paid to the economic foundations for the choice of tasks for the system to solve. It is emphasized that, as a result of increased scientific-technical levels of ASUP, it is necessary to include the economic results of solving management problems by enterprise resources, which have immediate and unique manifestations in the change of the economic indicators of the plant, in calculations of ASUP effectiveness.

The annual growth in profits $\Theta_{\text{год}}$ due to ASUP operation is computed by using the formula

$$\Theta_{\text{год}} = \frac{A_2 - A_1}{A_1} \Pi_1 + \frac{c_1 - c_2}{100} A_2 + \delta \Pi^{\text{н}},$$

where A_1, A_2 are the annual volume of production achieved corresponding to the period before and after the introduction of the ASUP, in R1,000; c_1, c_2 are the costs in kopeks expended for R1 of achieved production corresponding to the period before and after the ASUP is introduced; Π_1 is the profit from the production achieved before the ASUP is introduced, in R1,000; $\Delta\Pi^a$ is the additional profit due to reduction of nonproductive losses (penalties, fines, forfeits) due to the introduction of the ASUP, in R1,000.

The principal special feature of the new sector methodology is the accounting within the overall effect of the ASUP of its national economic constituents, which are attendant upon the operation of the system in the corresponding spheres of the national economy. The range of coupling in this sphere is limited by the first circle of sectors. The necessity for considering results of introducing the ASUP such as savings due to the improved quality of the production, and the effect of freeing up, because of the increased volume of production output, of capital resources and the creation of new production capacity within the sector are also anticipated.

An important byproduct of the methodological directives being considered is the clear demarcation of elements of one-time expenditures and savings. For this reason, the effect of freeing up working capital is counted not as part of the capital expenditures for creating the ASUP, which distorts its actual size, but as a corresponding constituent of savings.

Annual savings are determined by using the formula

$$\mathcal{Э}_1 = \mathcal{Э}_{пр1} + \mathcal{Э}_к + E_н \left[\Delta O_c^a + \frac{K_0}{1000} (A_2 - A_1) \right],$$

where $\mathcal{Э}_к$ are the savings due to increased production quality, in R1,000; $E_н$ is the normalized coefficient of economic benefits from capital investment; ΔO_c^a is the change in the amount of working capital as a result of introducing the ASUP, in R1,000; and K_0 is the sector-specific capital investment per R1,000 of increase in production.

The annual benefit from increases in the quality of production as a result of introducing the ASUP is computed based on methods adopted in the sector for the given form of production. Two primary benefits have to be considered here: Benefits to the manufacturer of the product with increased quality from increases in prices; and the additional profits to the users of the product with increased quality, when benefits from increased quality are substantiated and reflected in the financial indicators of the user enterprises and user organizations.

The annual economic benefit is found by using the formula

$$\mathcal{Э} = \mathcal{Э}_1 - E_н K_1^a.$$

where $K_{\text{ед}}^{a}$ are the allowable expenditures connected with the creation and introduction of the ASUP, in R1,000.

The economic benefit of one-time expenditures for the creation of the ASUP is determined by using indicators

$$T = K_{\text{ед}}^{a}/\Theta_{\text{э}}, \quad E_{\text{э}} = \Theta_{\text{э}}/K_{\text{ед}}^{a} \geqslant E_{\text{НБТ}},$$

where T is the payback period of one-time-only expenditures, in years; E_p is the computational benefit coefficient of one-time-only expenditures in creating the ASUP; E_{HBT} is the sector normalized benefit coefficient of capital expenditures for the creation of the ASUP and for the introduction of computer technology.

Significant among other basic indicators of ASUP benefits are the special aspects of determining the annual volume A_2 of achievable production after the system is introduced, which is computed by using the formula $A_2 = A_1\gamma$; here

$$\gamma = (100 - a_2)/(100 - a_1),$$

where a_1, a_2 are per-shift losses in work time in percent of its general fund corresponding to the period before and after the introduction of the ASUP.

In calculating the economic benefits of the ASUP for the enterprise with limited enterprise resources (labor, material, and equipment), it is necessary to remember that the increase in production output is possible only by reducing losses in these resources. In this case, the more precise coefficient of growth in realizable production is determined as follows:

$$\gamma_{\text{ут}} = 1 + (\gamma - 1)\frac{\min\{\Delta A_i\}_{i=1}^{i=3}}{A_2 - A_1}, \quad \Delta A_i = \frac{\Delta P_i}{q_i},$$

where ΔP_i is the expected reduction in losses for the i-th production resource in physical (for labor resources and downtime for equipment corresponding to 1,000 manhour and machine hours) and cost (for material resources in R1,000) dimensions due to the introduction of the ASUP; q_i is the expenditure of the i-th production resource corresponding to the physical (in thousands of manhours or machine hours) and cost (in R1,000) dimensions per R1,000 of production output while using ASUP.

The average indicators of ASUP benefits, valid for ASUP's introduced at the enterprises of the machine and instrument industry during 1972-1975, that have been inserted as examples of the described methodology directives,

are of practical interest as are the sources for the annual volume of profits due to operation of the ASUP, and the value of a number of parameters that characterize the change in work indicators of an enterprise following the introduction of an ASUP.*

*This is laid out in detail in an article by I. A. Kruchinin, V. Kh. Lev, and V. S. Starkov, "ASUP's and Economic Benefits in Production," issue 5 of this journal for 1977.

6948
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C. Economic Control at Local Level

Translations of Articles

IMPORTANT MEANS OF INCREASING THE QUALITY OF ADMINISTRATION

Kishinev KOMMUNIST MOLDAVII in Russian No 2, Feb 79 pp 69-74

[Article by A. Morar', director, Department of Science and Technology, Administration of Affairs, Council of Ministers, Moldavian SSR; and I. Tsaran, chief, Department of Automated Management Systems and Computing Technology, Gosplan, Moldavian SSR]

[Excerpt] In ministries, agencies, enterprises and organizations of the country there are already over 3,000 automated management systems (ASU) including over 1100 systems for management of complex technological processes and machine units. Their hardware base consists of 2500 computer centers. The ASUs of the Ministry of Instrument Making, Automation Equipment, and Control Systems, USSR, the "ASU-Pribor" operate successfully at such large enterprises as "Uralmash," Moscow's "Frezer" plant, Lvov Television Plant and others.

In our republic [MoldavianSSR] the regular application of economic and mathematical methods and electronic computer technology in planning and management started in 1968. In the years of the 9th Five-Year Plan and the first half of the 10th FYP, three interagency automated management systems were put into operation at the level of start-up complexes and first phases. (Gosplan Control Statistical Administration and Moldavian Scientific-Research Institute of Scientific and Technical Information); 29 sector ASUs (including ministries of construction, motor transport, food, meat and milk industry); 24 automated control systems of enterprises, 3 to manage technological processes. Total savings obtained for 1971-1978 from automated management systems and computer technology has already amounted to 12.5 million rubles.

There are now 35 intersector and sector ASUs, 34 for enterprise management, and 6 for technological processes. Particular attention has been given to the development and installation of automated systems for planning

calculations of the State Planning Commission of the Moldavian SSR (ASPR). It considers the experience gained in planning in our country and new possibilities connected with the use of economic and mathematical methods and computer technology. The ASPR is expected to provide a substantive rise in quality of planning via optimization, based on analysis of multivariance of calculations performed by the end of a given period. The system was developed as a complex of interconnected subsystems: sector (agriculture, food industry, etc.); consolidated and consolidated-balance (cost price and profit, labor, personnel, etc.). At the end of 1976 its first phase, encompassing 110 tasks, was put into operation.

The material and technical base of ASUs is continually being reinforced. The national economy of the republic now contains 69 computing centers, divisions, laboratories and other organizations. They are equipped with over 130 electronic computers of various types and purposes, including third generation unified systems computers (YeS EVM) having a wide range of productivity and program compatibility, mini-computers designed mainly for automated management systems for technological processes. Their capacity reaches 2,400,000 operations per second.

Development and operation of ASUs of various levels and purposes employs over 6,000 persons. The front of scientific-research work has expanded. The Institute of Mathematics and the computing center of the MoldSSR Academy of Sciences has done research in the field of automated construction of translating systems, creation of algorithms, economic and mathematical models and methods of optimization of development of the republic's national economy; development is completed on a regional complex system of control of product quality using mathematical models and computer technology. The Scientific-Research Institute of Planning of the Gosplan, MoldSSR has done work to create dialogue systems and automated data bases.

Training of personnel of both average and upper qualifications has been organized. At Kishinev State University and Polytechnic Institute this is being done in the specializations of "applied math," "mechanized processing of economic information," "computers," "construction and production of electronic computer apparatus," etc. Scientific personnel are also trained here.

The development of scientific research, the solution of several questions on personnel training, the achievement of some started projects in planning and starting up the operation of sector and intersector ASUs has permitted a shift to the next stage in work: creation of the republican automated management system (RASU MoldSSR). Since the use of ASUs is linked with profound changes in the understanding of management tasks, it is very important to have a "first manager" principle: ordering of ASUs, their development and installation are done with the direct participation of the first manager of the appropriate object (ministry, agency, association or enterprise). The main manager of development and installation of sector

ASU should be the first person of the appropriate ministry or agency (Organizational Chart of Creation of ASU in MoldSSR is given later).

If we add up the capacities of the computer pool, number of experts engaged in planning and operation of ASUs, the scope of processes of planning and control in separate sectors, union republics and the national economy as a whole, we can then claim that a great new trend of scientific and technical progress is being formed in the country. But, as noted in decisions of the party and administration on this issue, ASUs and computing centers have still not become important means of raising efficiency of social production, have not led to substantive changes in the style and working methods of the central apparatus of ministries, agencies, enterprises and organizations, nor to a reduction of expenditures for content and elimination of superfluous control links.

These shortcomings are inherent in our republic. Analysis shows that a rise in the scale of use of these means for management of production here does not always lead to achievement of the anticipated economic effect. The basic cause is that some ministries and agencies set up ASUs without detailed examination, study and preparation of the plant, necessary economic justification or needed systems approach to coordination. Little attention was given to automation of technological processes and methods of control, improvement of organization of structure of all links in the industrial mechanism.

Work on improvement of technical and economic information for ASUs is insufficient, as is technology of its preparation and transmission, incorporation of devised subsystems, creation of a unified system of forming, processing and storage of standards and statistical information: automated data bank, sector data banks of algorithms and programs.

The composition of many functional subsystems of ASU does not cover the entire set of tasks necessary for effective management of an enterprise or sector. They have a very small portion of planned optimization tasks with the use of economic and mathematical methods (under five percent). Meanwhile, these are the tasks that yield the greatest effectiveness in planning and predicting processes, permit analysis of the best directions of capital investments, increasing production output and improving product quality, to achieve rhythmic production, more efficient use of existing resources and so forth. In some cases, planning and installation of ASUs is done apart from other organizational, economic and technical measures to improve control.

In many ministries and agencies, the percentage of exploitation of planned management tasks is very low. Thus in the system of the Ministry of Municipal Services of the republic, out of 26 ASU planned tasks only 5 are being used; the Ministry of Construction and Exploitation of Highways--40 out of 68; Ministry of Construction--53 out of 67. Such a situation

is mainly created as a result of weak linkage of planning and installation work of the ASU with periods of delivery of computer hardware, and preparation of proper facilities. Another cause is the lag of information and software behind the development of the computer pool. This does not permit timely preparation of tasks for incorporation, increases consumption of machine time for their solution, and results in low efficiency of electronic computers. In 1977, for example, their use in the republic comprised an average of 7.5 hours per day, while in the Moldavian branch of the All-Union Planning and Technological Institute of the Central Statistical Administration, USSR--it was only 2 hours per day.

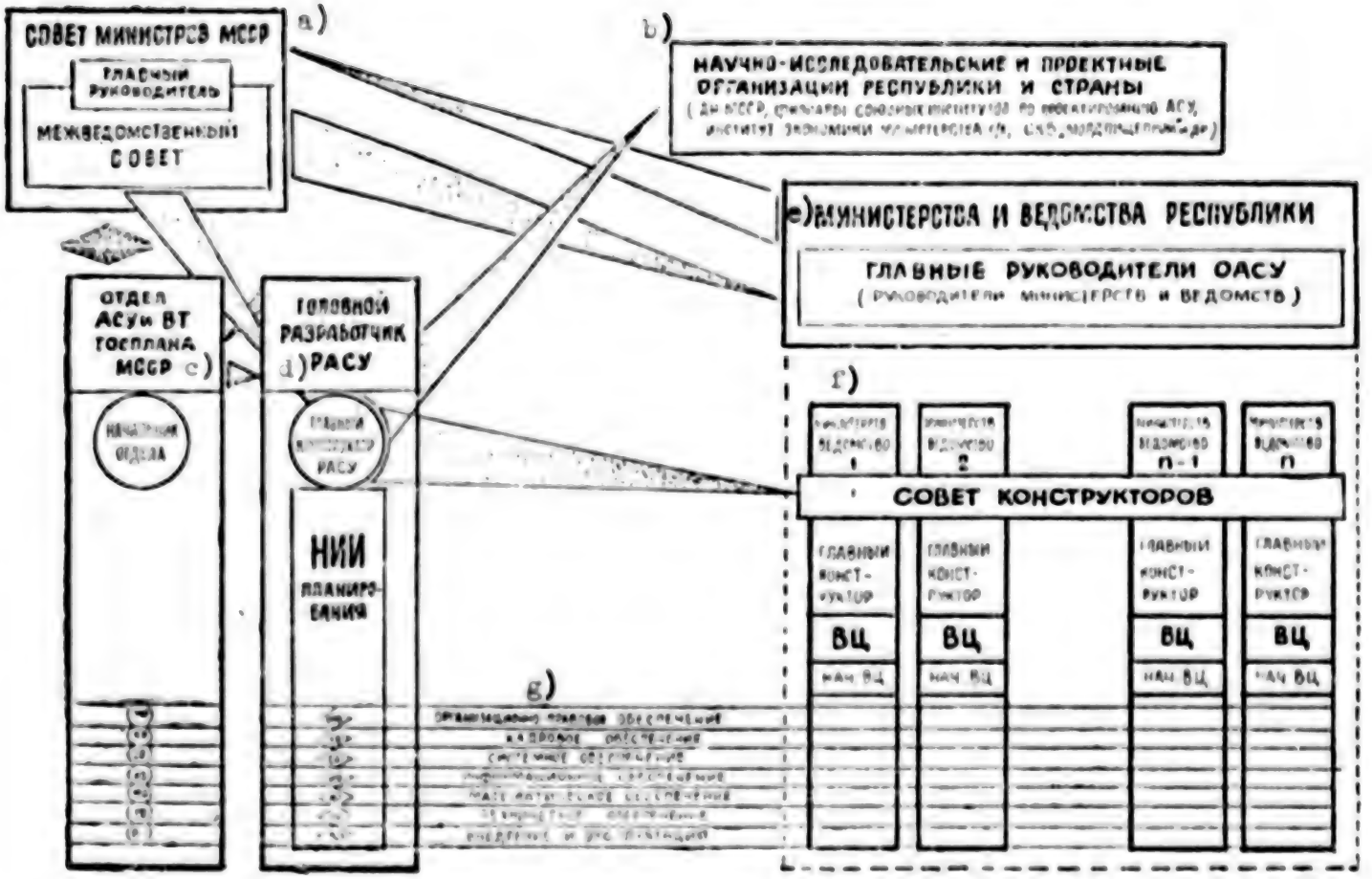
The creation of automated management systems is complex and difficult. To successfully resolve it, it is not only necessary to have great material and financial resources, systems analysts, developers, engineers, economists and organizers. It is also necessary to have a significant rearrangement of the operating organization structures of management, planning and report indicators, standardization of paperwork turnover, clear organization of communication, concretization of functions of workers and raising their responsibility for timeliness and reliability of information.

Confirmation of the "Organizational Chart of Creation of ASUs in Moldavia" and experience gained can thoroughly improve and accelerate work on planning and set-up of automated management systems. Attention is now being concentrated here by the Republican Interagency Council on Questions of Improved Management of the National Economy. Toward those ends, coordination of work both inside sectors and in the republic as a whole is being intensified; their organization based on directed programs, centralization and typification of ASU planning is being done; methods of planning are being improved to allow for ASUs and economic mechanisms of control of enterprises, associations and sectors; work is being expanded on creation of ASUs of technological processes; centralization of distribution of all computer hardware is taking place.

Much attention has been given to problems associated with observation of the principle of organizational, methodological and technical unity of automated management systems, preparation of experts, with analysis of economic effectiveness of developed systems, typification of planned systems, with planning and financing of work.

These questions become especially vital since work on creation of ASUs has greatly expanded. Thus, in the 10th Five-Year Plan in the republic it is planned to incorporate 17 sector and 22 enterprise ASUs, and to create 13 new computer centers. The number of ASUs of technological processes increases 7-fold. The volume of studies on organization of RASU MoldSSR will increase considerably.

Transition to creation of time-shared computer capacities of various types should be implemented more actively. This theoretically new direction



ORGANIZATIONAL CHART OF ASU CREATION IN MOLDAVIAN SSR

[Key: a. MoldSSR Council of Ministers, Main supervisor, interagency council; b. Scientific Research & Planning organizations of republic and country (MoldSSR Academy of Sciences, branches of union institutes on ASU planning, institute of economics, ministry of agriculture, design bureau Moldpishcheprom and others; c. ASU and VT division of MoldSSR State Planning Commission, head of division; d. Main developer of RASU, chief constructor of RASU, Scientific research institute of planning; e. ministries and agencies of republic; main supervisors of ODSU (managers of ministries and agencies); f. ministry or agency, council of constructors, chief constructor, VTs, head of VTs; g. organization and law, personnel, systems, information, software, hardware, installation and operation]

meets increasing needs of the national economy for information and computing operations, designation of new computers, and support of optimum utilization.

In all studies done on the creation of ASUs, at the forefront should be placed the final national economic result; thus important value is being acquired by questions of improvement of evaluative indicators of these systems. We should also consider that the ASU is a dynamic system, it will be rearranged allowing for rapidly changing control objects, their functions and indicators.

Automated management systems are a powerful instrument to raise quality of management of the socialist economy. Acceleration of their development and incorporation will permit a great rise in effectiveness of social production, more successful solution of tasks posed by the 25th CPSU Congress in the development of the national economy.

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Abstracts of Articles

USSR

THE COMPUTER COUNTS APARTMENTS

Riga SOVETSKAYA LATVIYA in Russian 5 May 79 p 4

KORCHAGINA, V., correspondent

[Abstract] Leonid Mikhaylovich Kharitonov, deputy director of the Information and Computation Center at the Latvian SSR Ministry of Municipal Economy, explains in an interview with this correspondent how inventory of the republic's municipal resources is taken now, since the automated data reference system "Municipal Economy" has been put in operation last year. The system uses a data bank, like any other automated management system (ASU), to which all pertinent information at the Office of Technical Inventory is being transferred. The data bank was 25 percent complete by December 1978 and should be 100 percent complete by the middle of 1981. The immense volume of data and documents is handled by a computer. The purpose of this system is to track any changes in the condition of all elements in a municipality: houses, streets and also open land parcels. With the proper dedication and interest of managers and all other personnel, full utilization of this system will result in better planning as well as a more efficient and thorough maintenance, as well as fewer letters with complaints and inquiries to the newspaper.

D. Extractive Industries, Fishing

Translations of Articles

USSR UDC 622.323+622.24 003.1

PROBLEMS IN THE DESIGN OF AN AUTOMATED SYSTEM FOR PLANNING CALCULATIONS

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 3-26
set of seven articles

[Text] Introduction

This issue of the scientific-economic reference journal EKONOMIKA NEFTYANOY PROMYSHLENNOSTI includes papers presented by participants of the industry-sector economic seminar held on 9 September 1978 by the "Priazovneft'" Petroleum and Natural Gas Extraction Administration of the "Krasnodarneftegaz" Association on the subject "A system of buildup and utilization of funds for encouragement of production within the Association." At this seminar problems in the design of the automatic system for planning calculations were also considered. For publication, papers of theoretical and practical interest to workers in the petroleum industry have been selected.

Abstracts of Articles

USSR UDC 622.323+622.24 003.1

PROGRESS IN DEVELOPMENT AND INTRODUCTION OF THE PETROLEUM EXTRACTION SECTOR SUBSYSTEM OF THE AUTOMATED SYSTEM FOR PLANNING CALCULATIONS

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 3-8
manuscript received 15 Dec 78

SIMONOV, YU. B., All-Union Scientific Research Institute for Organization, Administration and Economics of the Petroleum and Natural Gas Industry

[Abstract] Development of the automated system for planning calculations (ASPR) with contents and a structure defined by the USSR State Planning Committee, was begun in 1974 and has proceeded according to the Coordination Schedule. All general and procedural guidance comes from the Main Computation Center of the USSR State Planning Committee. The nationwide scheme of economic planning with the aid of this system constitutes a complex multilevel hierarchical structure and yields all basic indicators of a functioning national economy. The ASPR is constructed accordingly and, furthermore, performs calculations not only systemwide but also for individual levels and branches within the hierarchy. It finally provides for matching independently calculated indicators at different levels. The subsystem "Neftedobycha" ("Petroleum Extraction") of this automated system is being developed within this overall framework and also to specific requirements of the petroleum industry. It is designed for growth, and for operation at the ministerial level from the Main Information and Computation Center as well as at the Association level from a Group Information and Computation Center, with provision for administrative input from the USSR State Planning Committee. Plans are developed for a long range (10-15-20 years), a medium range (5 years) and a short range (1 year), covering production and capital investment, costs and revenues, labor and material-technical supply. All calculations are algorithmized with maximum flexibility. The first-generation subsystem had been completed and introduced by 1976, the second-generation subsystem was subsequently introduced in 1977. It is now being tied into automated accounting in appropriate administrative departments. Further expansion of the

"Neftedobycha" subsystem is aimed horizontally to include contiguous industry sectors, namely transportation and pipelines, as well as vertically to cover individual Associations such as "Kuybyshevneft'" (Kuybyshev Petroleum). The whole system, on the other hand, will be expanded to cover geophysics and machine design. It will be used for setting up the complete industry-wide 1980 plan.

USSR UDC [622.323+622.24]003.1

EXPERIENCE IN DEVELOPMENT AND INTRODUCTION OF THE PETROLEUM EXTRACTION SECTOR SYSTEM OF THE AUTOMATED SYSTEM FOR PLANNING CALCULATIONS

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 8-10
manuscript received 17 Dec 78

VARTANOV, S. P. and KAMENETSKIY, S. G., Ministry of the Petroleum Industry

[Abstract] Much experience has been gathered since 1975 at the Main Information and Computation Center with the automated system for planning calculations. The document "Technical and Economic Principles of Petroleum Extraction" has been computerized and the indicators defined therein calculated according to programs and algorithms originating at the All-Union Scientific Research Institute for Organization, Administration and Economics of the Petroleum and Natural Gas Industry (VNIIOENG). This experience in long-range and short-range planning, including selection of optimum plans, with the computer time reduced from days to hours since the beginning of the system's operation, is useful for the current development of the system's second generation. The latter will include five functional components: "production," "capital investment," "material and technical supply," "costs, revenues and profitability," "labor and personnel," which altogether involve 35 calculations. The second generation differs from the existing system in that the data volume has increased by several orders of magnitude, the number of independent users of the system has increased, and in that neither the production system in general nor the system for planning calculations in particular are treated as invariables in time and space. Furthermore, not only present needs but also future needs are considered in the design. The engineering design stage was completed in 1977. In the current stage of a workable design a problem is not seen as an a'priori given sequence of computations, but rather as formulated in response to a user's specific requirement. The concept of parametric programming is applied here and, as of now, the system can calculate over 1000 indicators, the user can provide his own data base and store answers in his own data bank, provisions are made for adequate man-machine dialog either through a display or through punch

cards, and the software is designed to allow boundless modification and expansion of both data and algorithms without alteration of the programs. Tables 1.

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MAIN TRENDS IN CONSTRUCTING THE SECOND-GENERATION FUEL AND ENERGY CALCULATION SUBSYSTEMS OF THE AUTOMATIC SYSTEM FOR PLANNING CALCULATIONS FOR THE USSR STATE PLANNING COMMITTEE

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 10-13
manuscript received 22 Dec 78

ZVEREV, V. A., USSR State Planning Committee (Gosplan)

[Abstract] The first stage of developing an automated system for planning calculations (ASUP) for the USSR State Planning Committee and for such committees of individual Soviet republics has been completed. The system, with the aid of a computer, can solve over 3000 problems on the basis of economic-mathematical models. The first generation of this system covers sectorwide, intersectoral and independent tasks. It includes a fuel-energy complex consisting of two subsystems for fuel and energy calculations respectively, solving a total of over 100 problems. All solutions arrived at in the engineering design stage and all documentation subsequently produced serve as the basis for development of the second generation. The latter is to have a standard technical base using third-generation Unified System computers with extensive peripheral equipment for adequate man-machine dialog. It should also use optimized mathematical models for long-range as well as short-range planning. The next goal is solution of problems with complex-wide coordination from lowest to highest level within the two subsystems, also with ministerial and departmental coordination. Some difficulties in achieving this are the still incomplete tie-in with Unified System computers, the still incomplete All-Union product classification, the lack of a universally suitable data processing technology, and the fact that the existing system performs all fuel and energy calculations throughout in the local mode without interaction with other subsystems. The second generation will have a logic structure to allow for inclusion of new indicators by simple expansion of classifiers, for increasing the complexity of problems by algorithm and program buildup, for extending the range of [illegible] problems by adding new data bank segments, and for solving problems on the basis of information coming from the USSR State Planning Committee's minicomputer. All these improvements should result in a better coordination of the ASUP, particularly its fuel-energy complex, with ministerial and departmental automated management systems (ASU).

USSR UDC 622.323+622.24 003.1

AUTOMATION OF COMPLEX PLANNING ON THE BASIS OF PETROLEUM DEPOSIT EXPLORATION PROJECTS IN WESTERN SIBERIA

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 13-15
manuscript received 12 Dec 78

BATURIN, YU. YE., Siberian Scientific-Research Institute of the Petroleum Industry

[Abstract] Long-range planning of petroleum extraction in terms of technical and economic indicators is now expediently done on the basis of known technologies employed in earlier and present exploration projects. Much practical experience has been gained in deposit exploration projects in Western Siberia, successful only because of computer-aided automated data processing. For planning the exploration of deposits to be retapped, the automated planning system must include three functional components, namely a subsystem for interpretation of geophysical data obtained by well drilling and testing, a subsystem for geological-morphological analysis of bedrocks, and a subsystem for planning the technology largely determined by filtration processes. The subsystem for geological analysis is managed by V. A. Bal'dyanov at the Siberian Scientific-Research Institute of the Petroleum Industry (SibNIINP), while the methodology of calculating the economic parameters has been developed by I. A. Ponomareva at that Institute. The system is programmed for various modes of exploration and extraction, by gushers or with displacers. Mathematical models for permanent use in petroleum exploration and extraction are now being completed at the Institute of Control Problems (IPU) of the USSR Academy of Sciences.

USSR UDC 622.323+622.24 003.1

EXPERIENCE IN DEVELOPMENT OF THE AUTOMATIC SYSTEM FOR PLANNING CALCULATIONS FOR THE PETROLEUM AND NATURAL GAS EXTRACTION ASSOCIATION

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 16-19
manuscript received 25 Dec 78

POZHILOV, YU. F., "Kuybyshevneft'" (Kuybyshev Petroleum) Association

[Abstract] The "Kuybyshevneft'" Association was chosen as one of the principal enterprises involved in the design of the automated system for planning calculations for petroleum and natural gas extraction, according

to the Coordination Schedule for development of automated management systems in this industry sector within the 1976-80 period. Work on this project was begun in March 1976 and, with the aid of the Group Information and Computation Center of this association, all specification for the system (structure, modes of operation, organizational and procedural requirements, software requirements, and also information, engineering, legal, and personnel requirements) were submitted ready for review to the All-Union Scientific Research Institute for Organization, Administration and Economics of the Petroleum and Natural Gas Industry in June of that year. First a thorough study had been made of the system at the ministerial level. Subsequently development of the system at the association level was embarked on jointly by "Kuybyshevneft'" and the All-Union Institute, with the cooperation of various other institutions. While the "production" subsystem is developed at the "Kuybyshevneft'" Group Information and Computation Center, the "science and engineering" part of the system is developed at the Kuybyshev Polytechnic Institute, the "drilling" part of the system at the Kuybyshev Planning Institute, and standards for the system are developed at the Kuybyshev branch of the All-Union Institute. The major difficulties encountered so far are essentially organizational in nature, due to duplication of efforts and resulting divergence of results. In order to eliminate these obstacles, to complete on schedule the development of this automated system for planning calculations for the Petroleum and Natural Gas Extraction Association, it is necessary to centralize and coordinate all design activities, preferably through a special council, to systematize the flow of documentation, and to engage a staff with broad expertise.

USSR UDC 622.323+622.24 003.1

PRINCIPAL DESIGN SOLUTIONS INCORPORATED IN THE AUTOMATED SYSTEM FOR PLANNING CALCULATIONS FOR THE PETROLEUM AND NATURAL GAS EXTRACTION ASSOCIATION

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 18-23
manuscript received 10 Dec 78

LACHKOV, A. G., All-Union Scientific Research Institute for Organization, Administration and Economics of the Petroleum and Natural Gas Industry

[Abstract] The software of the automated system for planning calculations for the Petroleum and Natural Gas Extraction Association, developed jointly by the "Kuybyshevneft'" Association and the All-Union Scientific Research Institute for Organization, Administration and Economics of the Petroleum and Natural Gas Industry, is based on projections by the state, governing

statutes, and directives from the Ministry of the Petroleum Industry with some documents coming from the sector subsystem "Neftedobycha" ("petroleum extraction"). The first generation of this software system includes six functional components: "production," "capital investment," "labor and personnel," "material and technical supply," "costs and revenues," and "composite plan," with the "science and engineering" component to be completed in later stages of the system development. Calculations are performed on the basis of structural models and forecasts, on the basis of governing standards, or on the basis of expert estimates. The "production" planning program covers yield, capacity and modes of operation, applicable to petroleum and to natural gas respectively, and includes drilling of wells, requirements for water or other displacing-pressurizing agents, and geological exploratory operations. The "capital investment" planning program covers equipment for exploration of deposits and tapping of reserves, also for reinvestment in enterprise expansion and reconstruction, investment in refurbishing of present enterprises, maintenance of present capacities and in new construction. The "material and technical supply" planning program covers the most critical items as well as fuel and energy resources needed for "production," i.e., for well drilling and petroleum extraction, altogether 37 items. This program is being extended not only to cover more materials but also to control consumption of materials. Materials and technical supply for "capital investment" will be included in later stages of the system development. The "labor and personnel" planning program covers the operations directly, including jobs and functions, also associated activities such as transportation by the various available modes and including delivery through pipelines. It also covers wages and the wage structure targeted toward three possible objectives: maintenance of production levels, increase of production levels, decrease of unit labor cost of production. The "costs and revenues" planning program covers cost of goods delivery to the site and income from industrial activity, also profitability and cost effectiveness. All these programs and the algorithms are being continuously refined, improved and simplified so as to reflect more accurate calculations and to reveal interrelations between indicators in subsequent stages of the developed system. References 6 (Russian).

USSR UDC 622.323+622.24 003.1

DISTRIBUTION OF CAPITAL INVESTMENT OVER THE PLANNED PERIOD OF YEARS UNDER CONDITIONS OF OPERATION WITH AN AUTOMATED SYSTEM FOR PLANNING CALCULATIONS

Moscow EKONOMIKA NEFTYANOY PROMYSHLENNOSTI in Russian No 4, Apr 79 pp 24-26 manuscript received 20 Dec 78

GOLOV, L. V., GERMAN, V. T. and TER-SARKISYANTS, S. R., All-Union Scientific Research Institute for Organization, Administration and Economics of the Petroleum and Natural Gas Industry, Ministry of the Petroleum Industry

[Abstract] In short-range (1 year) and medium-range (5 years) planning of construction projects there arises the problem of most rational capital investment schedules. The problem of distributing this investment over the planned period of construction is solved here mathematically, on the basis of project continuity standards. The algorithm essentially involves comparing the time of capital infusion with the total construction time, with the capital infused at any time referred to the total budgetary worth of the construction object. The capital distribution coefficients are calculated accordingly for recurring construction projects and, with appropriate corrections, for transitory construction projects. Typical numerical values are shown for the construction of a petroleum pipeline 1000 mm in diameter and 1000 km long, to be ready for operation by February 1980. Figures 2; tables 2; references 2 (Russian).

E. Manufacturing and Processing Industries

Translations of Articles

UDC 658.562.018.2

IMPROVING THE SYSTEM OF CONTROL OF LABOR AND PRODUCT QUALITY IN THE PRODUCTION ASSOCIATION "MIKROPRIBOR"

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1979 pp 40-41

[Article by I. V. Ivanenko, general director of the Production Association "Mikropribor" and G. G. Zubov, candidate in technical science]

[Text] The production association (PA) "Mikropribor" imeni the 60th Anniversary of the Soviet Ukraine consists of a main plant, SBD [Special Design Bureau] of microelectronics in instrument-making (SBD IM), a repair and construction administration and four affiliates in rayons of L'vov Oblast. Approximately 200 types of instruments are produced.

The decree of the CC CPSU on the work experience of the party organizations and the collectives of the leading industrial enterprises of L'vov Oblast in developing and applying a complex system for product quality control has been an important landmark in solving the tasks of effective control of product quality. The PA "Mikropribor" was among the enterprises mentioned in this decree. It will be recalled that as early as 1971 the L'vov electric meter plant (today the PA "Mikropribor") introduced one of the varieties of the L'vov variant of the Saratov system of the BIP [Tool and Device Office] Bureau--a system of control of labor and product quality (CLPQ).

It is well known that the standards of the enterprise (StE) are the normative technical base of the complex system of product quality control (CSPQC). The StE are an integral part of the state system of standardization (SSS) functioning on the enterprise (association) level. Nearly 150 of these standards, which regulate the CSCPQ, are in effect in the PA "Mikropribor."

The set of StE of the PA "Mikropribor" ensures the organizational and technical coordination and realization of three basic subsystems: the

parametric contour, which reflects the technical level of production and establishes requirements in addition to the products list of technical characteristics (this is where the so-called "anticipatory" standards of the enterprises come in); the functional contour, which realizes the basic functions of control over public production--making and organizing the implementation of decisions, carrying out regulation, accounting and inspection (in conformity with the goals of labor and product quality control, these functions are specialized according to the stages of the production cycle); and the organization and labor contour, which regulates the realization of the well known elements of scientific organization of labor and control at all stages of the production cycle.

Control of labor quality is an important element of the CSCPQ. The system of methods on control of labor quality encompasses all levels of control and all stages of product creation and with the help of the StE makes it possible: to evaluate concretely and objectively and compare the results of the work of different collectives (sectors, shops and divisions) for a given period under review (month, quarter or year); promptly and systematically inform the management of the shops, divisions and affiliates of the association about all cases of deviation of product quality from the established level and about violations of the technology of their manufacture; to take timely measures for restoring the requisite program level of quality; to implement measures for moral and material motivation rationally and to educate each worker and increase his sense of responsibility for the quality of the goods produced.

Provision of material incentives is accomplished in the association in accordance with the group StE worked out in the development of the "Basic Statutes on the Payment of Bonuses to Workers of the Production Associations and Industrial Enterprises for Basic Results of Economic Activity." In the association a bonus is given for fulfilling additional indices--the planned index of production regularity and the generalized coefficient of labor quality K_k in terms of the CSCPQ.

The given coefficient is the criterion resulting from evaluation of the quality of the work of the performers and collectives of all the subdivisions and enterprises of the association.

Since July 1978 for each subdivision, depending on its functional duties and the character of the work executed, a group of positive indices is planned, the sum of which equals 100 points. It may be expressed by the formula

$$K_k = P_1 + P_2 + \ldots + P_n = \sum_{i=1}^{n} P_i,$$

where $P_1 - P_n$ = the indices of labor quality developed for all subdivisions of the enterprise depending on the specific character of their production

activity. When all the indices are fulfilled, K_k = 100, i.e., the initial standard level of quality.

When some quality indices or other are not fulfilled, the corresponding number of points is not included in the tabulation, correspondingly reducing the significance of coefficient K_k, on the basis of which the bonus is given. The significance of this coefficient achieved by the collective of a shop affiliate, division or service (tabulated data) is the personal generalized coefficient K_k of the management of the subdivision, their deputies, the heads of the planned distribution bureau and the heads of the industrial bureau (the bonus for the indicated managers is calculated on the basis of this coefficient). For the collectives of the mentioned subdivisions the significance of the coefficient K_k is taken into account only in summing up the results of socialist competition between the subdivisions of the association.

The significance of coefficient K_k for each worker of a subdivision is calculated by the manager of the internal subdivision (at the given level of control) contained in the structural subdivision (shop, division).

The management of the subdivision also take stock of their subordinates' indices of labor quality and record the work results in the quality index logs and on special display stands of visual propaganda on the CSCPQ.

During the period under review (month, quarter) the management of the subdivision sends to the labor and wages division reports which indicate the significance of each performer's coefficient on the basis of which the bonus is given.

In order to improve work on labor and product quality control and the transmission of experience to the enterprises and organizations of the Ministry of Instrument Making, Automation Equipment and Control Systems, a scientific research division of the CSCPQ was added to the structure of the SBD IM in 1976. At present it is a basic cost-accounting division consisting of three sectors: development of complex systems of control; control of the technical level and the quality of developments; introduction of the CSCPQ and exchange of experience.

In our opinion, the creation and introduction of automated CSCPQ must be considered the main direction in the further development and improvement of systems of quality control in modern conditions. The association has developed promising programs for developing the CSCPQ during the entire 10th Five-Year Plan.

We are well aware that the full-scale creation of an effective CSCPQ is a complex, prolonged and labor-consuming matter. To begin with, it presupposes the solution of such complex problems as development of a new (optimal organizational structure for the association and of concrete,

specialized functions for all its units. It will be necessary to find optimal solutions for efficient organization of planning and creation of promising new implements and for improving the organization of the entire production cycle of goods produced; to determine the information flows and their document base; to solve the problems of the program software, etc.

Operation of the tasks of control of labor and production quality is regulated in the association by machine-directed StE. The top priority complex of automated tasks of the CSCPQ encompasses accounting, control and analysis of the results of quality control at all stages of the production cycle. At the present time 22 tasks are being realized in the association.

Work on product quality control is being conducted on third generation computers. Using the UVK M-6000 an ASU [automated system of management] of technological monitoring of digital measuring instruments is being created and introduced. This system ensures automation of labor-intensive management and regulatory operations at different stages of production with mathematical processing of the results of measurement.

Since early 1978 experimental adoption of goals for support of monitoring the observance of industrial discipline in the plant and for input monitoring of the quality of materials and completed products has been begun.

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F. Transportation System

Abstracts of Articles

USSR UDC 681.3.19./47

INFORMATION MODEL OF AN AUTOMATED MANAGEMENT SYSTEM FOR SUBWAY PASSENGER TRAFFIC

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 121-124 manuscript received 3 Jan 77, after revision, 7 Aug 78

SHMELEVA, YELENA VLADIMIROVNA, instructor, MIIT (Institute of Railroad Transport Engineers), Moscow

[Abstract] An information model is developed for the Moscow ASU (automated management system) for subway passenger traffic in order to study the load on the computer complex of the traffic management system. By means of this model, a computer can reproduce the processes of message origination in the system that depend on deterministic factors (traffic schedule and parameters of the automatic driver system) as well as random factors (deviations of the actual times of train passage through stations and connecting lines). Modeling is based on calculation of the actual times of arrival, departure and transit as the train actuates feedback sensors on connecting lines. Traffic is treated as steady-state, characterized by a uniform parallel schedule. Random departures that arise in actual practice are accounted for by sampling of random quantities with a distribution law and parameters taken from the records of the Moscow Subway Line. References 5 (Russian).

USSR

AUTOMATIC MANAGEMENT SYSTEM FOR THE OSETROVO RIVER PORT

Moscow RECHNOY TRANSPORT in Russian No 1, 1979 pp 22-23

PALESTINOV, A., chief of the Information and Computation Center for the Osetrovo River Port

[Abstract] The first-generation automatic management system (ASU) in the Osetrovo River port has been in operation since 1977. Its one subsystem controls the cargo on piers and warehouses; its other subsystem controls the fleet of vessels. Furthermore, the system provides for automatic processing of documentation and scheduling of harbor equipment repair. Both subsystems operate with data banks, and information coming respectively from piers and vessels is teletyped directly to the computer center for processing. Operation of this ASU "Port" has already revealed some of its deficiencies. Although a powerful base is available in the form of two "Minsk-32" computers, links with the piers are not perfect and five teleprinters must be added to the existing four. There is no link with the Western pier and, in case of equipment breakdown on this or some other pier, communications are transmitted by messenger. The slow pace of automation of the port activities is mainly caused by the shortage of expert professional personnel and unfamiliarity of the present staff with modern information processing techniques.

USSR

PREPARATION FOR TASK PERFORMANCE BY AN AUTOMATIC MANAGEMENT SYSTEM

Moscow RECHNOY TRANSPORT in Russian No 1, 1979 pp 23-24

KHEYFETS, M., candidate in technical sciences (deceased)

[Abstract] The automatic management system (ASU) for the Volga Associated Steamship Transportation Enterprise performs up to 10 tasks every year, but some deficiencies in it cause lengthy service disruptions. An analysis of the causes shows that the main ones are departures from the "engineering problem--engineering design--workable design" sequence (according to recommendations in industry-sectorwide procedural guidance documents) which have occurred in development, a typical case in point being the "fleet activity accounting and analysis" task inadequately performed because of poor data organization. Implementation of preliminary measures had been postponed from the design stage to the operational stage, software had been

proofread in operation rather than checked in preliminary tests, programs had been approved on the basis of efficiency and processability rather than on the basis of completeness, and input data are not adequately checked because of incomplete instrumentation. Furthermore, the data storage capacity is inadequate so that extensive man-machine dialog is required and the computer time for problem solving becomes very long (4-5 h on a "Minsk-32"). Finally, while a well developed system of departmental communication is available to the Ministry of the River Fleet, it is necessary to resolve any ambiguity in management of communication for automated and nonautomated steamship activities. Correction of all these flaws and, particularly, proper organization are of utmost importance in successful implementation of the ASU for Volga River Fleet activities. References 1 (Russian).

C. Construction

Abstracts of Articles

USSR

CALCULATION OF MATERIAL REQUIREMENTS ON A COMPUTER

Moscow NA STROYKAKH ROSSII in Russian No 5, May 79 pp 28-29

SUMAROKOV, V., director of the Information and Computation Center, Main Administration of the Volga Construction Trust

[Abstract] Completion of structures and start of operations are often delayed because of unsatisfactory material deliveries. A proper coordination of shipments, an optimum allocation of resources, especially of critical materials, and establishment of economic incentives are the objectives of new methods of material and equipment supply. The immensity and the complexity of this problem call for computer aid and mathematical techniques of solution. Accordingly, programs have been written for YeS-1020 computers of the Unified System, to meet all these objectives within the framework of Structural Norms and Regulations. The type and the magnitude of construction projects provide the input data here, the material requirements calculated with adequate precision and printed out alphanumerically constitute the output data. For administrative and budgetary purposes, furthermore, the aggregate material requirements for the entire region can be estimated yearly or quarterly. Management according to this program helpful where expenditures for material of the order of 165-170 million rubles yearly, as in the case of the Volga Construction Trust (including the Saratov House Building Combine), are estimated and realized. Tables 3.

H. Accounting and Statistical System

Translations of Articles

ON A SECTORAL SYSTEM FOR THE MANAGEMENT OF UNIONWIDE CLASSIFIERS OF TECHNICAL AND ECONOMIC INFORMATION

Moscow VESTNIK STATISTIKI in Russian No 3, 1979 pp 42-51

[Article by Vasiliy Yefrimovich Gumenyuk, candidate in technical sciences, senior scientific associate and chief of the laboratory of the Scientific-Research Institute of the Central Statistical Administration of the USSR]

[Text] The significance which is attributed at the present time to the unionwide classifiers of technical economic information (OK TEI) is primarily explained by the growing intersectoral management links of enterprises and organizations at different management levels, consequently, by the increase in the volume of data circulating between them.

The unionwide classifiers which are an important component part of the informational support of the ASGS [automated system for state statistics], are finding ever increasing applications in the design of electronic information processing complexes and analytical complexes, as well as in the design of automated data banks.

The introduction of the OK TEI is based on the reliable information of the classifiers. In this regard, the question of the design of an OK TEI management system, which maintains the classifiers up to date and supplies users with reliable information, takes on particular significance.

Studies have shown that because of the large volumes of information in the OK TEI and its numerous changes, it is expedient to solve this problem by means of designing an automated system for managing the unionwide classifiers, using modern computer equipment in this case.

Working documentation has been developed at the present time in the USSR Central Statistical Administration, and a sectoral system for managing the unionwide classifiers of technical economic information (OSVOK TEI) has been

organized and is functioning on this basis. This system provides for handling a Unionwide Classifier of Sectors in the National Economy (OKONKh), the System of Designations of the State Administration of the USSR and the Union Republics (SOOGU, the System of Designations of the Objects in the Administrative and Territorial Breakdown of the USSR and Union Republics, as well as Populated Points (SOATO), the Unionwide Classifier of Enterprises and Organizations (OKPO) and the operational servicing of the ministries and departments, local administrative organs and state statistical organs with the materials of these classifiers. It should be emphasized that the OSVOK TEI for managing the OKPO performs the functions of an overall state system.

The basic tasks of the OSVOK TEI are as follows: procedural supervision and monitoring the handling of the classifiers or their sections in various links in the system; the organization of information gathering concerning changes in the classifiers; the assigning of identification codes to newly formed objects; the updating of the classifiers; the preparation, coordination and presentation in the VNIIKI [All-Union Scientific Research Institute of Technical Information, Classification and Coding] of the USSR State Committee on Standards of Collections of Changes and Supplements to the OKONKh, SOOGU and SOATO for expert evaluation and approval; the presentation, coordination with the VNIIKI of the USSR State Committee on Standards, the approval, publication and dissemination of the publications, "Changes and Supplements to the OKPO"; periodic notification of the system of management services of the USSR State Statistical Administration concerning changes taking place in the classifiers (by means of disseminating magnetic tapes); the organization and management of the archive; the servicing of the territorial organs of the State Statistical Administration with the materials of the classifiers; periodic inventory and preparation of the materials for republication of the classifiers; and informational servicing of sectoral and territorial management systems upon request.

One of the basic problems in the project planning for the OSVOK TEI is the determination of its organizational structure, since the optimal distribution of the complex of problems and the information flows between subsystems, the organization of an efficient interrelationship and operationally timely exchange of information both between structural units of the system under consideration and with other systems for handling classifiers and processing economic information, and consequently, the effective functioning of the system being designed depends on the correct solution of this problem. The determination of the OSVOK TEI organizational structure is made on the basis of technical and economic criteria, which takes into account the resulting management structure for the national economy, the tasks assigned to the management system and its individual subsystems, the information volumes circulating both in the individual links and in the system as a whole, functional operational efficiency, capital outlays, etc. The resulting composite national economic control structure, which in many respects determined the organizational forms of the ASU's [automated management systems] being planned and in service, and the scheme for their layout,

served as the major one of the factors enumerated above which influence the OSVOK TEI structure.

An analysis of the variants of the structures of the system for handling OK TEI has made it possible to choose an efficient organizational structure for OSVOK TEI, which is shown in Figure 1.

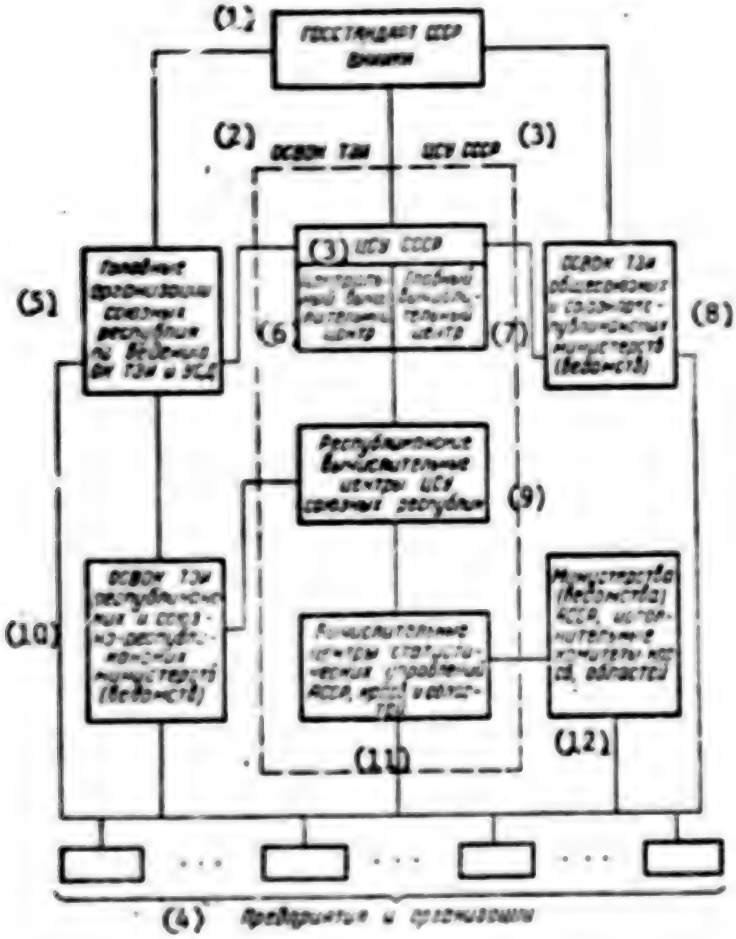

Figure 1. The organizational structure of the Sectoral System for Managing Unionwide Classifiers of Technical Economic Information

Key: 1. The USSR State Committee on Standards, VNIIKI [All-Union Scientific Research Institute of Technical Information, Classification and Coding];
2. OSVOK TEI [the Sectoral System for Managing Unionwide Classifiers of Technical Economic Information];
3. The USSR Cetnral Statistical Administration;
4. Enterprises and organizations;
5. Head organizations of the union republics for the managing of OK TEI [unionwide classifiers of technical economic information] and USD [unified system of documentation];

[Key to Figure 1, continued]:

6. Central computer center;
7. Main computer center;
8. The OSVOK TEI of the unionwide and union republic ministries (or departments);
9. Republic computer centers of the Central Statistical Administrations of the Union Republics;
10. The OSVOK TEI of the republic and union republic ministries (or departments);
11. Computer centers of the statistical administrations of autonomous SSR's, krays and oblasts;
12. Ministries (or departments) of autonomous SSR's, executive committees of krays, oblasts.

It can be seen from the Figure that the sectoral system for handling unionwide classifiers has three hierarchical levels, incorporates a set of management services organized at the union, republic and oblast levels of the ASGS on the basis of existing computer centers, and is based on both the interaction of its services within OSVOK TEI, and on the interaction of the corresponding services of the system with other sectoral and territorial management systems. In particular, this system interacts with:

--The VNIIKI [All-Union Scientific Research Institute of Technical Information, Classification and Coding of the USSR State Committee on Standards] as the head organization which provides expertise, approves changes in the OKONKh, SOOGU, SOATO, and coordinates the publication of the issues of "Changes and Supplements to OKPO";

--The sectoral systems for managing unionwide, union-republic and republic ministries and departments and local management organs as regards receiving information from them concerning changes in the classifiers and servicing them with the appropriate OK TEI data;

--The head organizations of the union republics for handling OK TEI as regards supplying them with issues of "Changes and Supplements to OKPO";

--Enterprises and organizations which are subscribers to the system.

The first hierarchical level of OSVOK TEI includes the Central Computer Center of the USSR Central Statistical Administration as the head organization for managing OKPO, SOATO and the Main Computer Center of the USSR Central Statistical Administration for the management of OKONKh and SOOGU; the regional computer centers of the Central Statistical Administrations of the union republics belong to the second level, and these centers manage the classifier data or their corresponding sections needed when processing

statistical information at the republic level; the computer centers of the statistical administrations of autonomous SSR's, krays, and oblasts, which manage the unionwide classifiers or their sections necessary when processing statistical information at the given management levels belong to the third hierarchical level.

Experience with the functioning of OSVOK TEI has demonstrated that the structure considered here optimally meets the tasks and requirements of sectoral and territorial national economic management principles, is rather flexible and responds in an operationally timely manner to changes taking place in classification objects.

Two supportive subsystems comprise the basis of OSVOK TEI: informational and program technology support.

Informational support (IO) includes the entire aggregate of information and documentation which functions in the system, and the ways of representing, storing, converting and transmitting the data. The following are included in the IO complement: the unionwide classifiers; information on changes in them; archive information; reference works; documentation which provides for the gathering, monitoring, processing, storage and transmission of the data; and the set of methods which regulate the updating of classifiers and the legalization of the output results.

The unionwide classifiers belong to the base information which reflects the state of the classified set at the specified point in time and which is the immediate management object. The primary vehicle for this information in OSVOK TEI is magnetic tapes (ML). The base information arrays which are produced on technical vehicles include the set of subarrays, the data in which are arranged in increasing order with respect to various attributes. Thus, the OKPO array consists of the set of subarrays of the ministries, the information in which is ordered with respect to the increase in the identification codes of enterprises and organizations, which are structurally incorporated in the given ministries (or departments).

The classifiers are kept reliable by operationally timely information concerning changes in the classifiers, where this information is characterized by a small amount of handling time in the system (the time period from the moment the corresponding changes occur until the moment they are introduced into the OK TEI) and which directly reflects the dynamics of national economic development.

The primary sources for the generation of this information are the corresponding management organs. The cause of the appearance of such information is related to quantitative transformations of OK TEI (the insertion or erasure of individual classifier positions) and to the transformation of the individual particulars of classification objects (the designation of the objects, their location, their industry sector affiliation).

Changes for OKPO can be conditionally broken down into two groups. The following belong to the first group:

--The elimination of an object (code 01). Changes of this type are generated when terminating the functioning of objects or when objects lose the rights of a legal entity in the case where they are transferred to the complement of an association (or combine) or an association of several enterprises (or organizations);

--Placing a new object in service (code 31). Changes of this type are generated when new objects are placed in service or when associations (or combines, enterprises) are broken up and these objects are given the rights of a legal entity.

The following belong to the second group:

--A change in the designation and codes of object attributes (code 10). They are generated in the case of a simultaneous change in the designation (renaming) of objects or their location and a change in the codes of a territory, sector or combination of them;

--The renaming of an object (code 11). Changes of this type are generated in the case of a change in the designation of objects or the renaming of their location, as well as in the event of a change of the location of objects within the limits of a territorial unit (a union republic without an oblast breakdown, an autonomous SSR, kray, oblast);

--A change in the code for a territory (code 12). The changes are generated in the case of change in the codes of classification objects, related to the formation (or elimination) of administrative territorial units (a republic, kray, oblast) or to a change in their boundaries, as well as in the event of a change in the location of objects, which entails changes in the territorial codes of the objects;

--A change in the code for a sector (code 13). Changes of this type are generated when forming (or eliminating) sectoral groupings in the Unionwide Classifier of National Economic Sectors [OKONKh] or a change in the type of activity of enterprises (or organizations), as well as in the case of a change in the OKONKh codes;

--The transfer of an object from ministry to ministry (code 17);

--A change in the code of a ministry (code 22). Changes of this type are generated in the case of change in the code for one or a group of SOOGU objects.

Archive information is used to solve problems for which data are required for preceding periods. It is generated on the basis of unionwide classifiers

and the changes in them, and takes the form of retrospective information concerning classification objects, which reflects the dynamics of national economic growth. The information is stored on magnetic tapes in the form of individual subarrays, the data of which is arranged in order of increasing identification codes of the objects.

Reference works are used to assure the efficient organization of the individual data processing steps, in particular, the monitoring of the information incoming to the system, the minimizing of the data processing and search time, as well formatting and printing out the final documents. These reference works take the form of a reference information array, generated on the basis of the OK TEI, stored in traditional and technical vehicles.

Some four groups of documents are employed in the functioning of OSVOK TEI: directive, base, operating and reference.

Directive documents include: legislative acts, orders, statutes on the management system and its services, and the corresponding set of instructional material. This documentation reinforces the organizational and legal status of the system and its interaction with external organizations, defines the functional procedure of the system when managing the unionwide classifiers, the process of information collection, processing and transmission, and also stipulates who, in what times and in what form as well as to whom the corresponding type of information is presented.

The base documents are the official publications of the unionwide classifiers, which reflect the state of the OK TEI at a particular point in time. Thus, the OKPO is presented in the form of duplicated printouts from an alphanumeric printer, which are formatted in a volume of standard shape, each of which contains a classifier section for the unionwide, the union republic or republic ministry (or department), as well as for the local management organs of a union republic; the OKONKh, SOATO and SOOGU consist of individual books, published typographically.

The operational documents include notices of changes in classifiers, information bulletins which inform management system subscribers of changes in the OK TEI, as well as documents which contain requests for various types of information contained in the classifiers, and the answers to them.

Reference documents are of an auxiliary nature and contain: the OKPO reference volume with information on the location of each ministry or department in the official multivolume classifier publication, as well as supervisory and inventory catalogues which allow for monitoring the OK TEI changes incoming to the management system, and also the documentation used in correcting the classifiers.

The technological software for OSVOK TEI takes the form of a complicated set of procedures and programs, combined in a single technological information processing process, and provides for updating classifiers and o'taining replies to requests.

A listing of the basic procedures of the technological information processing process is given in the flow chart and the sequence for their execution by the individual OSVOK TEI services and the system as a whole is shown. Thus, the sectoral management services of ministries and departments, when changes appear concerning objects in their own divisions, the classifier is drawn up in two copies, "Ministry (or Department) Notification of changes in the OKPO" and they are routed to the appropriate address along with the order, based on which it was drawn up. In this case, the management services of the uniomwide and union republic ministries (or departments) of the USSR forward the changes concerning union subordinated objects to the GVTs SSSR [Main TsSU Computer Center of the USSR Central Statistical Administration], the management services of the republic and union republic ministries (or departments) of union republics forward changes concerning objects of a republic and dual subordination to* the RVTs TsSU [regional computer center of the Central Statistical Administration] of the union republic, while the management services of the ministries (or departments) of an ASSR, the executive committees of the kray and oblast councils of peoples' deputies route he changes concerning locally subordinated objects to the computer centers of the statistical administrations.

Each of the services of the corresponding OSVOK TEI hierarchical level performs the following technological operations in the process of updating a classifier.

The computer centers of the statistical administrations of ASSR's, krays and oblasts accomplish the gathering and visual checking of the changes concerning enterprises and organizations subordinated only to local management organs, and forward one copy of "Notification of Ministries (or Departments) of Changes in the OKPO" to the regional computer center of the Central Statistical Administration of the union republic. Where there is the appropriate understanding between the Central Statistical Administration of the union republic and the republic or union republic ministries (or departments) of the union republics, the computer centers of the statistical administrations of ASSR's, krays and oblasts also collect the changes concerning objects of a dual subordination from the ministries (or departments) of the ASSR and the administrations of kray and oblast executive committees of the council of peoples' deputies.

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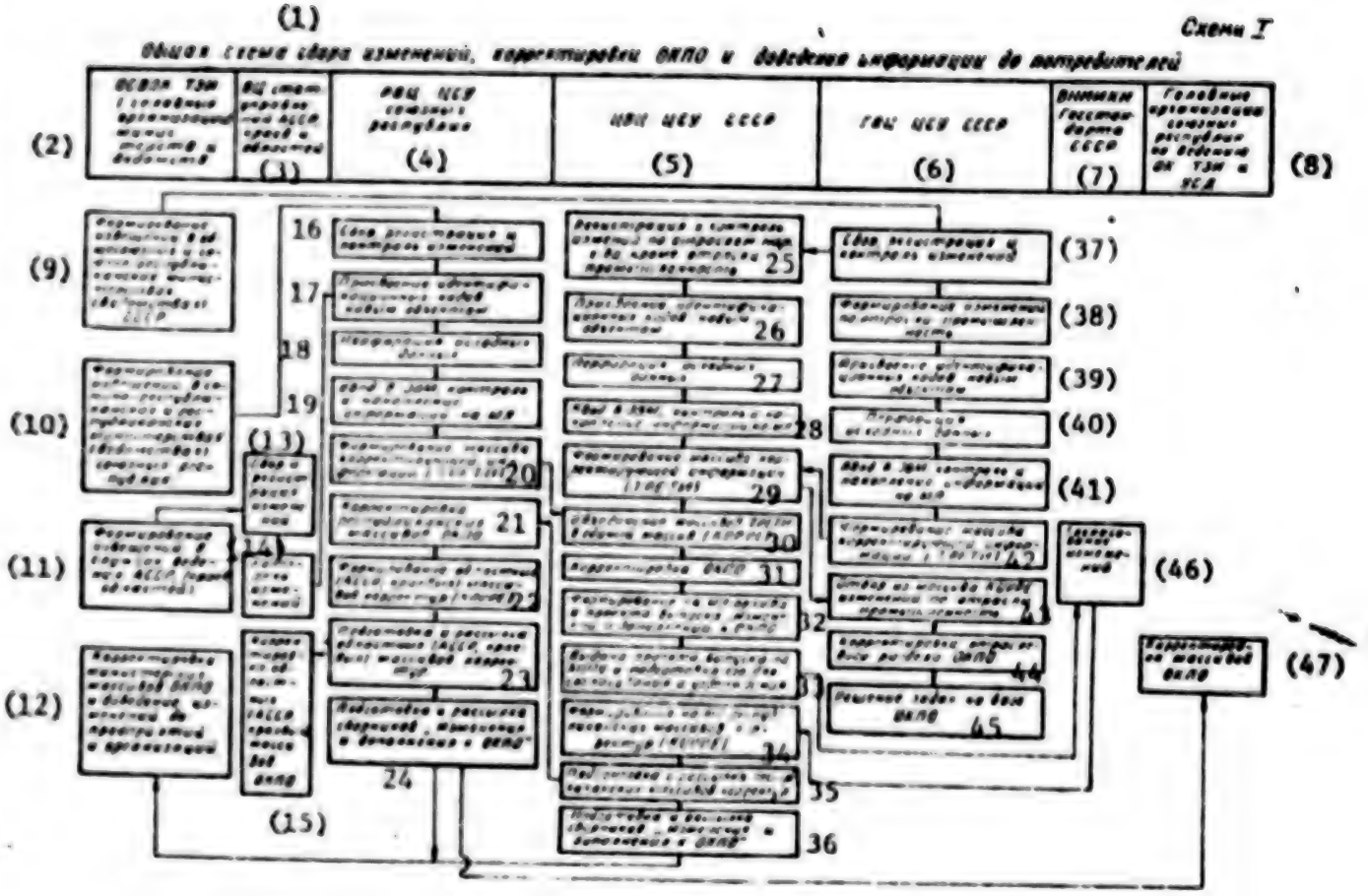
*Enterprises and organizations which are subordinated both to the ministries and departments of union republics, and to the local management organs of ASSR's, krays and oblasts, are included among objects of a dual subordination.

Flow Chart I



[Key on following page]

[Key to chart on preceding page]:

1. The overall scheme for collecting the changes, correcting the OKPO [unionwide classifier of enterprises and organizations], and supplying the information to the users;
2. OSVOK TEI [sectoral system for the management of unionwide classifiers of technical economic information] (the head organizations) of ministries and departments;
3. The computer centers of statistical administrations of autonomous SSR's, krays and oblasts;
4. Regional computer center of the central Statistical Administration;
5. Central computer center of the USSR Central Statistical Administration;
6. Main Computer Center of the USSR Central Statistical Administration;
7. The All-Union Scientific Research Institute of Technical Information, Classification and Coding of the USSR State Committee on Standards;
8. The head organizations of union republics for the management of OK TEI [unionwide classifiers of technical economic information] and USD [the unified system of documentation];
9. The production of the notifications in the unionwide and union republic ministries (or departments) of the USSR;
10. The production of notifications in the union republic and republic ministries (or departments) of the union republics;
11. The production of notifications in the management services of autonomous SSR's (krays, oblasts);
12. The correction of ministerial OKPO data arrays and the forwarding of notifications to enterprises and organizations;
13. The correction and recording of changes;
14. Checking the changes;
15. Correction of the oblast (or autonomous SSR, kray) OKPO data arrays;
16. Collecting, recording and checking the changes;
17. The assignment of identification codes to new objects;
18. Key-punching the initial data;
19. Entering the information into the computer, checking and storing it on magnetic tape;
20. The production of the data array of the correcting information (TRET);
21. The correction of the republic OKPO data arrays;
22. The production of oblast (or autonomous SSR, kray) correction data arrays (KORRE);
23. The preparation and dissemination of oblast (or autonomous SSR, kray) correction data arrays;

[Key to Flow Chart I, continued]:

24. The preparation and dissemination of the "Changes and Supplements to the OKPO" reference works;
25. The recording and checking of changes according to national economic sectors, with the exception of the industrial sector;
26. The assigning of identification codes to new objects;
27. Key-punching the initial data;
28. Entering the information in the computer, checking and storing it on magnetic tape;
29. Producing the data array of correcting information (TRETI);
30. Combining the TRETI data arrays into a single array (KORRE);
31. Correction of the OKPO;
32. Producing the archive on magnetic tape as well as the draft issue of the "Changes and Supplements to the OKPO";
33. The printout of the draft issue on an alphanumeric printer and its preparation for coordination and approval;
34. The magnetic tape production of the republic correction data arrays (KORRE);
35. The preparation and dissemination of the republic correction data arrays;
36. The preparation and dissemination of the "Changes and Supplements to the OKPO" reference works;
37. The collection, recording and checking of the changes;
38. The production of the changes according to industrial sectors;
39. The assigning of identification codes to new objects;
40. Key-punching the initial data;
41. Entering the information in the computer, and checking and storing it on magnetic tape;
42. Producing the data array of correcting information (TRETI);
43. The selective collection of changes according to the industrial sector from the KORRE data array;
44. Correcting the sectoral OKPO section;
45. Solving problems on the basis of the OKPO;
46. Coordination of the changes;
47. Correcting the OKPO data arrays.

The regional computer centers of the central statistical administrations of union republics accomplish the following:

--The collection, recording and visual checking of the changes;

--The assignment of identification codes to new objects, structurally incorporated in the republic and union republic ministries (or departments) of union republics, as well as to enterprises and organizations subordinated to local administration organs;

--Key-punching the given information;

--Entering the changes into the computer, and checking and storing them on magnetic tape;

--The production on magnetic tape of the data array of changes (the TRETI data array) and forwarding it to the TsVTs TsSU SSSR.

The TsVTs TsSU SSSR manages the full volume of the OKPO and in this case, executes the following procedures:

--Reception of the "Notifications" from the VGTs TsSU SSSR, their recording and checking;

--The assigning of identification codes to new OKPO objects (with the exception of industrial objects), included in the unionwide and union republic ministries (or departments) of the USSR;

--The key-punching of the received array of changes (with the exception of the changes concerning objects of the "Industry" sector);

--Entering the changes in the computer, and checking and storing them on magnetic tape;

--Producing the data array of changes on magnetic tape (the TRETI data array);

--Combining the TRETI data arrays received from the GVTs TsSU SSSR and the RVTs TsSU [regional computer centers of the Central Statistical Administrations] of union republics with the analogous data array of the TsVTs TsSU SSSR into a single TRETI data array, preparing the latter for correction of the OKPO (the production of the KORRE data array), and transmitting it in duplicate to the GVTs TsSU SSSR;

--Correcting the OKPO and setting up the data archive for the changes in the classifier;

--Producing the draft of the regular issue of the "Changes and Supplements to the OKPO" on magnetic tape, printing it out on an alphanumeric printer, legalizing and coordinating it with the VNIIKI [All-Union Scientific Research Institute of Technical Information, Classification and Coding] of the USSR State Committee on Standards, approval by the management of the USSR Central Statistical Administration and supplying this issue to the unionwide and union republic ministries (or departments) of the USSR, as well as to the head organizations of the union republics for managing OK TEI;

--Producing the republic KORRE data arrays on magnetic tape and transmitting them to the appropriate regional computer centers of the central statistical administrations of the union republics.

The GVTs TsSU SSSR, having received the duplicate of the KORRE data array from the TsVTs TsSU SSSR, uses it to produce a sectoral data array of changes, and with the latter, corrects its own OKPO section.

The regional computer center of the Central Statistical Administrations of union republics, having received the territorial data array of changes (the KORRE data array) from the TsVTs TsSU SSSR, accomplishes the following:

--The correction of the republic section of a classifier;

--The production of the corresponding territorial KORRE data arrays on magnetic tape and sending them to the computer centers of the statistical administrations of autonomous SSR's, krays and oblasts (for republics with an oblast breakdown);

--The production of the "Changes and Supplements to the OKPO" reference works for objects located in the territory of a republic, and supplying them to republic and union republic ministries (or departments) of union republics, as well as to local management organs (for republics without an oblast breakdown);

--The production of the corresponding territorial "Changes and Supplements to the OKPO" reference works, and supplying them to statistical administrations of autonomous SSR's, krays and oblasts, which do not have computers.

The computer centers of the statistical administrations of autonomous SSR's, krays and oblasts, based on the data array of changes received from the regional computer center of the central statistical administration of a union republic, correct their own sections of the classifier and supply these data to local management organs and other system subscribers (RIVTs, RIVS, etc. [expansions unknown]).

The OKPO changes are collected as they occur, while classifier correction and the supplying of the information to consumers are accomplished monthly.

Information processing in the OSVOK TEI when managing the OKONKh, SOOGU and SOATO is accomplished manually at the present time and consists of the procedures for collecting the changes, coordinating them, correcting the classifiers following the approval of the changes, and supplying these data to the various links of the ASGS. The detailed technology for the information processing of the classifier data is given in the appropriate working documentation for OSVOK TEI.

The technological process of information processing in OSVOK TEI is realized by means of a set of programs which provide for the automated handling of the OKPO at all levels of the management system. The programs were developed in the algorithmic COBOL language for the "Minsk-32" computer and are employed in the solution of various OSVOK TEI problems.

The programs which execute the individual steps of the technological process of information processing have been combined into the following modules:

--The input module, which provides for the entry of the information concerning changes in a classifier into the computer, its computer checking, recording on magnetic tape and data printout on an alphanumeric printer for visual inspection;

--The module for producing the data array of corrections, which provides for the preparation of the input information array for the correction of the classifier;

--The correction module, which provides for entering the corresponding changes in the OKPO and reference works;

--The module for the production of the bulletin and the archive, which provides for the preparation on magnetic tape of the draft issue of the "Changes and Supplements to the OKPO," as well as the organization of the archive;

--The module for the production of the output documents, which provide for the reception on magnetic tape of the territorial (republic, kray and oblast), sectoral and other sections of a classifier, as well as the territorial information segment concerning the changes (the republic KORRE data array);

--The output module, which provides for obtaining printouts of the ministerial, territorial and sectoral sections of a classifier and the draft issue of the "Changes and Supplements to the OKPO," as well as the information of the TRETI and KORRE arrays.

Besides the procedures which inherently comprise the management of a classifier, the overall technological process of information processing in OSVOK TEI includes operations related to the solution of problems of an informational and reference nature. The solution of these types of problems is accomplished using programs included in the modules or the generation and printout of the final documents, and other service programs. Standard queries, incoming from system subscribers and basically dealing with information concerning specific classifiers serves as the initial data for the solution of these problems. For example, such queries will be as follows for the OKPO:

--To put out an OKPO section of the corresponding ministry (department), territory, sector (subsector) or for a combination of these attributes; to put out a list of OKPO objects according to identification codes or a range of these codes; to put out a list of OKPO objects of a specified sector (or group of sectors) or ministry (or group of ministries), located in the corresponding territory; to prepare data in the amount and in the forms of changes with respect to the OKPO for a specified time interval.

The changeover of the computer system of the USSR Central Statistical Administration to the YeS EVM [unified system of electronic computers] required the development of the software for the OSVOK TEI, oriented towards computers of this type, and the conversion of the classifier information from the magnetic tapes of the "Minsk-32" computers to the magnetic tapes of the YeS EVM.

The OSVOK TEI software, which is based on the utilization of the YeS EVM, is also built around a modular principle and incorporates the modules cited above. However, considering the broad capabilities of the YeS EVM's, the program complement of the individual models differs significantly from those realized at the present time in the OSVOK TEI. In particular, this is related to the fact that the organization of the individual information data arrays on magnetic disks and the direct access to them allow for the exclusion of a series of programs related to the ordering and retrieval of data in the various arrays.

Each of the modules has a control program (phase), which provides for the sequential execution of its routines. In this case, a provision is made in the programs for the capability of working with the information data arrays produced on both magnetic disks and on magnetic tapes.

A COBOL data converter, which transfers the information of the classifier and the reference works from the magnetic tapes of the "Minsk-32" computer to the YeS EVM magnetic tapes was employed to organize the OKPO data arrays on the technical vehicles of the third generation computers.

The changeover of the OSVOK TEI to the new technical basis will promote the further refinement of the system as regards the accumulation, processing, and storage of information, and will make it possible to provide the reliable information contained in the OK TEI in an operationally timely manner, as well as provide for the functional subsystems of the second stage of the ASGS and also the ASU's of the various management levels of the national economy, which accomplish the integrated processing of economic information on the basis of the uniomwide classifiers.

Operational experience with the OSVOK TEI in the system of the USSR Central Statistical Administration has shown that the basic principles for the design and functioning of the system, in particular, the selection of its organizational structure and the method of managing the classifiers, the development of the informational support and software, and the technological process of information processing in managing the classifiers can be utilized in the planning of similar systems in various ministries and departments.

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CSO: 1870

III. SOCIOCULTURAL AND PSYCHOLOGICAL PROBLEMS

A. Planning, Management and Automation of Scientific Research

Abstracts of Articles

USSR UDC 681.3.1:65.015.13

ORGANIZED COMMUNICATION FACILITIES IN DISTRIBUTED MODULAR AUTOMATED RESEARCH SYSTEMS BASED ON MINICOMPUTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 106-110 manuscript received 28 Feb 78

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[Abstract] An examination is made of systems of automation of scientific research in which minicomputers are used to automate local experiments with subsequent incorporation into a unified automation system. The structural organization of such systems is discussed in terms of the following four factors: 1) The topology of the research facilities and the territorial placement of the hardware in the system; 2) Economic criteria, reliability indices, availability, traffic-handling capacity and so forth; 3) The technological peculiarities of research projects that determine the type of communication equipment, memory volume, interference immunity, speed and accuracy of data processing; and 4) The operational characteristics of the systems. Particular emphasis is placed on problems of technical realization of interfacing between minicomputers, as well as between minicomputers and lines of communication with the controlled project. It is shown that a unified standard interface is preferable for these purposes. The use of interface modules in a multicomputer system enables realization of such systems operations as exchange of information directly between peripheral devices without going through a computer, line control transfer in case of computer failure,

ensuring standby and parallel redundancy, and also collective use of the same external devices by several computers with time sharing. Figures 2; references 9: 5 Russian, 4 Western.

USSR UDC 681.3.014:681.324/57.08

AN AUTOMATED EXPERIMENT SYSTEM FOR REAL-TIME INVESTIGATION OF THE BEHAVIOR OF BIOLOGICAL OBJECTS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 115-117 manuscript received 28 Sep 78

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[Abstract] A system is considered for automating experiments on the motor behavior of various biological objects, in particular with application to the influence that various natural and artificial physical fields have on the behavior of water organisms. The behavior of the study specimen is confined to a special tank. The system is made up of three Elektronik-100I minicomputers interconnected (each with its own multiplexor) by coupling modules of the SUMMA uniform computing system. Each computer has a working store of 32K 12-bit words and comes with an addable arithmetic unit, a real-time clock and a parity-check module. The entire system operates in conjunction with the peripheral equipment required for experiments. The SUMMA modules provide exchange between any of the three computers and the two others simultaneously. The operation of individual peripheral modules is examined. The authors thank V. I. Il'ichev, corresponding member of the Soviet Academy of Sciences, for participation and support in developing the system. Figures 1; references 4 (Russian).

IV. NATURAL SCIENCE RESEARCH

A. Biology and Medicine

Abstracts of Articles

USSR

EFFECT OF BIORHYTHMS ON PRODUCTIVITY

Moscow NA STROYKAKH RF ZII in Russian No 5, May 79 pp 30-32

ARAKEL'YAN, R., deputy chief of the Information and Computation Center, Department of Construction Organization and Engineering at the Main Administration of the Murmansk Construction Trust

[Abstract] Statistical data on traumatic conditions at the work place, based on many subjective factors, indicate a negative effect of biorhythms on productivity. Here this phenomenon is analyzed on the basis of the Svoboda-Fleiss theory and the three biocycles (physical 23 days, emotional 28 days, intellectual 33 days) are calculated for a typical individual almost 46 years old on 1 July 1978. Each of these cycles is assumed to be sinusoidal with positive and negative half-waves. The zero-crossovers of each cycle correspond to "bad days," concurrent zero-crossovers of any two cycles correspond to "very bad days," and concurrent zero-crossovers of all three cycles correspond to "critical days." After the total number of days of one's life from birth to the first day of the current month has been divided by the number of days in each particular biocycle, the remainder indicates where along that biocycle the first day of the current month can be located. This concept has already been applied to analyzing the performance of industrial vehicle drivers and the occurrence of accidents. For safety control, an extended program has now been undertaken by the Murmansk Construction Trust jointly with the Motor Transport Office to compile especially the very bad and the critical days of entire crews. A typical chart compiled with the aid of a YeS-1022 computer of the Unified System covers a crew of 800 drivers at the Motor Transport Office from April 1978 on and a crew of 700 drivers at the Murmansk Motor Transport Enterprise from July 1978 on. Drivers can thus be cautioned about bad and very bad days, and taken off their job on critical days. Figures 1; tables 3.

V. INFORMATION SCIENCE

A. Information Services

Translations of Articles

EXPERIENCE OF THE "ELECTRONICS" SECTOR SYSTEM OF SCIENTIFIC AND TECHNICAL INFORMATION

Moscow PRIBORY I SISTEMY UPRAVLENIYA in Russian No 4, 1979 pp 43-44

[Article by S. B. Abramov, candidate in economic science]

[Text] In October 1978 an exhibition with this title was held in the "Radioelectronics and Communications" pavilion of the VDNKh [Exhibition of the USSR National Economic Achievements]. It was prepared on the basis of the results of the sector review and competition of the organs of scientific and technical information (STI) of the electronic industry conducted in 1977.

The exposition included a number of divisions, characterizing all the types of information activity of the "Electronics" sector (otrasl') system of STI (BSSTI): procedural support of the BSSTI; a sector network of automated centers of STI--the "Electronics" ACSTI; a system of hardware for the sector network of ACSTI; information support to NII [Scientific-Research Institutes], EDW [Experimental Design Work] and production; analysis, correlation of information and differentiated provision of it to management; a system of inter- and intra-sector exchange of scientific and technical achievements (STA); publishing activity; scientific and technical propaganda; inventing and patenting and licensing work.

An introductory section gave a general description of the system, which acts as a reviewer to the manager, an assistant to the investigator and developer and an advisor to the technologist and production worker.

The structure of the BSSTI is determined by the goals and tasks of the system, and it consists of a number of functional and support subsystems: correlation and analysis of STI; information support for SR [scientific

research] and EDW on production; differentiated information service for management; inter- and intrasector exchange of STA; scientific and technical propaganda; patent and licensing activity and procedural, information, technical, program and linguistic support.

The procedural support is created on the basis of the program "Information" and is structurally subdivided into 14 sets, work on which is fulfilled in accordance with the five-year plan for developing STI.

Control of information activity and procedural guidance of STI are accomplished by the sector scientific procedure council on the problems of STI, which determines the major trends of the development of STI, recommending forms and content for different measures on STI.

One of these forms is the complex standardization and normalization of information activity in the associations and enterprises of the sector and the introduction of economic accounting in the STI services. In particular, introduction of a system of economic accounting to the information services in one of the associations has made it possible to increase labor productiveness 1.5-fold and to reduce the production cost of work 0.15-fold.

The purpose of the "Electronics" ACSTI is to supply specialists engaged in SR and EDW in the field of control with current, retrospective documentary information and copies of information documents. The given system is created and applied as a network of automated STI centers, which in future will be associated by channels of communication. At the present time exchange of information between the enterprises of the network is accomplished thanks to the development of standards and normalized documents, which regulate the information processes in the ACSTI.

The regular users of the system are the enterprises of the sector, the leading NII and EDW, some enterprises of the mixed sectors and the sector laboratories of the VUZ. All the enterprises of the sector and many enterprises of other sectors are occasional users. The total number of users is approximately 15,000.

Documents on the following topical aspects of electronic technology are inputted into the system: semiconductors and microelectronics; electric vacuum and gas-discharge instruments; radiocomponents; microwave frequency devices, quantum electronics, cryoelectronics; equipment, apparatuses and materials of sector-wide application; sector-wide problems, including economics, organization and control of production of the electronics industry, and electronics in the national economy.

The primary sources are reports on SR and EDW, publications from Soviet and foreign periodicals, materials of companies, conferences, symposia, translations, synopses, books, deposited manuscripts, etc. The integrated

bank of the network contains approximately 500,000 documents with annual input of 28,000 to 30,000 documents.

The system operates in a selective distribution of information regime (IRI), a retroactive distribution of information regime (RETRO) and microfilming and xerocopying regimes. It outputs information on standard long-term topical requests (the number of which is approximately 1300), single-time requests (on topics, types of documents, authors), single-time requests for copies (see figure). The system's reaction time, depending on the regime of operation, is 14-30 days.

The interrelation of the user with the ACSTI is set up in the following manner. On the basis of a listing of standard topical headings the users of the system formulate requests for service in different regimes. The subscriber is informed about the presence (absence) in the document file of documents responsive to the request. The report contains bibliographic data, the storage number of the document, numerical indices (cards, feedback). The user may be given xerocopies, rolls of microfilm or microfiches with the text of the primary source.

Solution of the goals of STI is based on the hardware system (HS) of contours I and II, which is the aggregate of the computer system, remote processing and communication, the terminal equipment, micrography apparatus and holography apparatus. Among the functions of the HS are support of the operation of the ACSTI in all regimes, including the regime of user dialogue with the sector system and the word processing system.

The multi-purpose computer--the basis of contour I--contains retrieval images and abstracts of documents. The micrography apparatus (contour II) stores copies of the original documents.

The basis of contour II is an automatic microcarrier storage unit which stores up to 50,000 documents (6000 microfiches-microfilm). At a command from the computer a copy of the requested document is outputted. The time of search and output of the copy is 40 sec.

Portable viewers and viewer-copiers, a technical description of which is presented in the table, are used for reading information from the microcarriers (MF GOST 133051-75, 105 x 148 mm). The latter unit also makes it possible to receive a full-size copy of a document recorded on the microcarrier.

For efficient loading of the computer memory and channels of communication the system uses a nonstandard device for compression and reduction of the textual information.

The base of the retrieval system of the ACSTI is a retrieval thesaurus on electronics--a dictionary which reflects the semantic relationships between the lexical units of the descriptive language. The thesaurus

contains 53 individual descriptions, 1187 descriptor and 870 nondescriptor items.

Information support (IS) of the research--development--production cycle is an important component of the BSSTI.

The IS subsystems of the subsectors, associations, the NII with plants, and of the plants offer the subscriber a wide choice of original, secondary and synthesized STI.

Differing somewhat structurally and organizationally, the IS systems of the different associations and enterprises supply specialists with information on the content of research conducted, prepare proposals on promising trends in research and developments, give materials, including analytic materials, for substantiating solutions of scientific and technical problems and creating new technologies, evaluate, monitor and plan the technical level, the patent-ability and patent clarity of new technology and stimulate the study and use of STA.

The subsystems of analysis and correlation of STI--one of the most important functional subsystems--has a flexible organizational structure and banks which include banks of analytic information and direction-procedural documents, rapid information publications, data arrays and an information bank.

Information distribution to specialists of different levels is accomplished within the framework existing in the "Electronics" TsNII [Central NII] and in the enterprises of the system of differentiated IS to management (DISM) of analytic information. The DISM systems are based on new methods of analysis and correlation such as information modelling of the problems and objectives of new technology, analysis of the "life cycle" of a class of implements, preparation of a system of analytic documents for management at different levels, a periodic extramural conference of specialists as a joint organ for working out recommendations on topical problems.

Methods of recovering and processing data are part of the subsystem. The timeliness of information distribution led to the creation at a number of enterprises of the sector of local data retrieval systems including automated systems using third generation computers, for example, the YeS-1020.

The system of inter- and intrabranch exchange of STA functions as an integral part of the all-state system of intersector exchange and mutual utilization of innovations.

The sources of information on STA are reports on completed SR and EDW, design and technological documentation, technical specifications, reference technical, normalized and procedural materials on problems of technology, organization, management and economics, dissertations, reports, lectures, resolutions of conferences and meetings and materials of exhibitions.

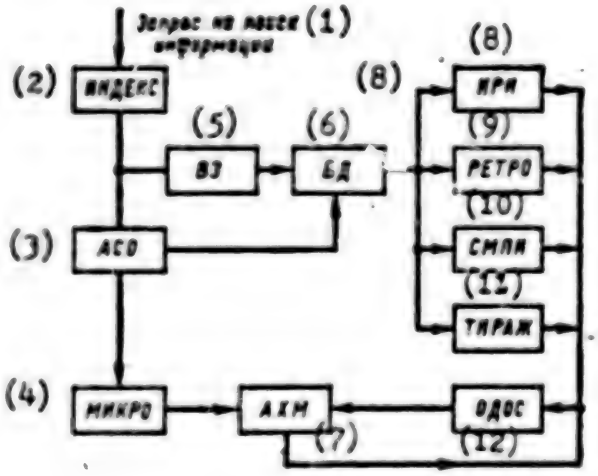
The criteria for selection of STA for transmission into the system of intersector exchange are novelty and timeliness, reproducibility, technical and economic effectiveness, patent protection, the presence of developed operating documentation.

The coordination and management center of the publishing activity of the sector--the "Electronics" TsNII--makes publishing plans, creates lists of classification headings for rational loading of publications, analyzes prepared and published materials, assigns them to topical series, develops procedural and standard technical materials which regulate the publishing activity. In addition, the institute is putting out information materials on questions of the economics and organization of the electronics industry, design theory, developments, the technology of manufacturing and industrial production of the products of electronic technology, quality control, automated control systems and STI. These materials are published in the collections "Elektronnaya promyshlennost'" [The Electronics Industry] and "Elektronnaya tekhnika" [Electronic Technology] (10 series), the bulletin "Zarybezhnaya elektronnaya tekhnika" [Foreign Electronic Technology], review information, summaries of reports, recommendations of scientific and technical conferences, meeting and seminars on electronic technology and in topical indexes of the literature.

The system of scientific and technical propaganda (STP) of the sector is a broad network of centers of propaganda of the achievements of electronics which function under the scientific and procedural management of the "Electronics" TsNII. The local centers of STI on the major trends in the development of electronic technology serve as the basic structural units of the network. Within the framework of the STP system, measures are taken which permit the network of centers to conduct propaganda on the achievements of electronic technology. The main form of STP is organization and conducting of exhibitions. A significant place in the STP system is given to problems of acquisition and use of data banks of information on the exhibitors of expositions. In particular, a corresponding automated data-processing reference system has been developed which is realized on an ES-1022 computer.

The system of information on inventions and patent-licensing activity, the transmission of which is centralized in the TsNII, brings to specialists of the sector and of other sectors of industry data on the patent clarity of the products of electronic technology of wide application, makes recommendations on patenting and the execution of licensing operations, determines the advertising circulation and patent documentation of the "Electronics" ASSTI in the ISR and RETRO regimes.

	Apparatus	
Element of Description	Viewer	Viewer-Copier
Amount of Increase 21		
Image (copy) dimensions, in mm	210 x 300	210 x 297
Type of screen (lamp)	coated	KGM-12-100
Power supply, in V	220 (50 Hz)	
Intake, in W	45	100
Overall dimensions, in mm	455 x 235 x 340	755 x 500 x 710
Mass, in kg	75	100



"Electronics" ACNTI

[Key on following page]

Key:

1. Request for retrieval of information
2. Indexing of information of request
3. Analytic-synthesizing processing
4. Microfilming of data
5. Secondary tasks
6. Data base
7. Automatic storage of microcarriers
8. IRI
9. RETRO
10. Word processing system
11. Printing of data
12. Processing of feedback data

9380
CSO: 1870

CONTROL SYSTEMS FOR AUTOMATED DATA BASES

Moscow VESTNIK STATISTIKI in Russian No 3, 1979 pp 36-42

[Article by Aleksey Antonovich Artyukevich, chief project designer of the Belorussian affiliate of the VGPTI TsSU SSSR [All-Union State Planning and Design Technology Institute of the USSR Central Statistical Administration], Leonid Ivanovich Borozna, division chief of the Belorussian affiliate of the VGPTI TsSU SSSR, Nikolay Vasil'yevich Kononov, director of the Belorussian affiliate of the VGPTI TsSU SSSR and Petr Vasil'yevich Kushner, chief project designer of the Belorussian affiliate of the VGPTI TsSU SSSR]

[Text] Specific experience has been acquired in our nation at the present time in the development of data base control systems. The following can be included among such systems: the information retrieval system (IPS-1), the automated information retrieval system using descriptors (ASPID); the "universal structure data bank" (BANK) SMO [queuing system]; the information control system (OKA); the remote processing dynamic system package (OST); the data processing and integration system (SIOD); the system for the organization of normative and reference information into a data base (NSI-DOS); and the system for the organization of normative and reference information (NSI-1-DOS).

The parametrization of the technical characteristics* serves as the initial prerequisites for the analysis of data base control systems.

We shall treat the systems as integral objects, including their original design principles.

The IPS-1 information retrieval system is intended for performing functions of defining, storing, managing and retrieving information. The following basic capabilities of its application as systems can be singled out: factual display and documentation; factual display, documentation.

The IPS-1 operational system consists of programs which perform the functions of loading, changing, retrieving and reorganizing unformed data. The data base is built from files, the entries of which consist of a variable number of fields. A field is defined by a name which assures unambiguous retrieval and processing. Where necessary, the fields can be shaped into a systematic classification and profiles of a group of facts. A profile of a group of facts is built from a certain number of fact groups. A group of facts consists of fields of designations and values of attributes. It is permissible to employ 999 profiles of groups of facts, with up to 99 attributes in a group. Retrieval interrogations are described using a rather high level interrogation language, convenient for programmers.

Interrogations can be entered from punched cards, perforated tapes, magnetic disks or through a terminal. Answers can be fed out on a wide printout, magnetic tape, magnetic disks or terminals.

The most favorable conditions for the use of the ITS-1 system are the storage and retrieval of information in the forms of the original documents, where the documents carry a large information content and there is a multiplicity of applications for the stored data. In the opinion of designers, approximately 1.5 years is spent in system adaptation.

The automated information retrieval system using descriptors (ASPID) is intended for performing the functions of defining, generating, managing, retrieving, and selectively disseminating documental information in accordance with the Boolean expression of the descriptors. Up to one million documents can be stored and processed in the ASPID data base.

The ASPID operating system consists of programs which perform the functions of loading, changing, retrieving and reorganizing documental data.

The data base is built up from the original appropriately indexed documents. The written constant length files consist of fields for the systemic part and the user part. Where necessary, the recordings are grouped into blocks.

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*We used the technical literature on the systems cited above in selecting the parameters of the technical characteristics.

Interrogations can be entered from punched cards, and replies can be fed out on a broad printout, magnetic tapes or magnetic disks.

The most favorable conditions for the use of the ASPID system are the storage and retrieval of documental information in the forms of the original documents, where there is the capability of appropriately indexing documents. The system adapts rather simply.

The SMD "universal structure data base," BANK, was developed for the organization of automated data banks, applicable to automated management systems (ASU) of instrument construction and machine construction enterprises.

The BANK operating system consists of macroinstructions, which perform the following functions: defining (describing) a data base (file, entries, fields); establishing a mutually unique correspondence between groups of entries; procedures performed on data (finding, eliminating, modifying or transferring an entry); and special functions (generating or reorganizing a data base).

The data base is built on files, the number of which depends on its volume, i.e., if the size of the data base proves to be more than one volume (200 cylinders), a new file is organized. A data base file recording consists of the systemic fields and the user fields. The recordings are grouped into blocks (data sets). The number of blocks is no more than 65,535. Each data base recording can be identified (with a key or address).

The most favorable conditions for the use of the BANK system: the organization of logically related data sets for the calculation of derived indicators.

The OKA information control system was designed for controlling intermediate and large volume data bases. This system performs the functions of organizing, managing and controlling data bases.

The OKA operating system, consists of a set of macroinstructions and procedures for determining, storing, changing and controlling the servicing of the data bases. Using the set of macroinstructions, one can write applied programs, which operate under the control of this system.

The data base consists of a set of data, which is understood to be the group of entries which are logically linked together. A data set has a name which assures for the unambiguous retrieval of the data set. The system allows for tying segments together with logic relationships.

The remote processing operational system (OST) package is intended for controlling the access to data bases, and serves as interface between applied programs and the operating system.

The OST operating system consists of the controlling, service and maintenance programs, access to which is provided by means of macroinstructions. The system of programs performs the functions of controlling the assignments and memory, processing interrupts, damping control, control of terminals, transit data and temporary storage, as well as service and maintenance functions. The most effective application of the OST system is the expansion of the capabilities of an operational system for the organization of packaged and remote data processing.

The SIOD data processing and integration system consists of a system of programs which perform the functions of determining a data base, and realize generalized and standardized functions in managing, organizing and putting out data for applied programs. A macroinstruction of the SIOD system handles each functio

The data base has a file structure. A distinction is drawn between the two types of files which the system can create: base file and connective file. Independent entries form a base file, while related ones form a connective file. The group relationships between the entries of the base, as well as between the entries of the base and connective files, are established by means of the address circuits. The files consist of entries which contain systemic fields and user fields.

The SIOD system is the most acceptable for the creation of a data base with a complex structure, with complex logic relationships between data groups. In this case, the composition of the data base structure should be located in no more than two base and two connective files.

The organizational system for normative and reference information, the NSI-DOS, was developed for creating an information data base in automated management systems of industrial enterprises. The operating system of the NSI-DOS consists of a set of programs, which perform the functions of organizing and servicing the data base, as well as of the interfaces with the applied programs. The NSI-DOS data base consists of files which contain fixed length entries. The purpose of the fields in the systemic portion of the entries is determined by the system and can be only partially changed by the user. The composition and structure of the fields in the user portion are not governed by regulations.

The most complete composition of the base can be represented as two base and two connective files, the entries of which are interrelated by logic relationships.

The system is best suited to the creation of a data base in which information is included which is structured in terms of form and similarity to the design and technological information for machine construction and instrument construction enterprises.

The system for organizing normative and reference information, the NSI-1-DOS, was developed to perform the functions of determining, storing and retrieving formatted data.

The NSI-1-DOS operating system consists of a set of universal program modules. The system is coupled to the applied programs by means of a procedural language. The NSI-1-DOS system allows for the creation of a data file, which consists of entries of the same type with a sequential or indexed sequential organization.

Given in the table are nine parameters with differing amounts of details. As can be seen from the table, the analyzed systems belong to systems having the capability of closed organizations, i.e., they are oriented towards the execution of a specific set of functions in the organization of data bases. It should be noted that two approaches can be taken in the systems analyzed here to the interfacing of the systems with the procedural languages (COBOL, PL, etc.): systems which do not have interfaces with procedural languages (IPS-1, ASPID, NSI-1-DOS), and systems which have an interface to such languages. The presence of interfaces with procedural languages provides additional capabilities for executing functions in a specific application.

The decisive factors in the use of the systems in a specific application are the languages capabilities as regards describing and manipulating data, since it is specifically they which serve as one of the basic tools in structuring data, obtaining complex structures and establishing the logic relationships between groups.

Two aspects of the data structure in the systems analyzed here must be considered: the logical and the physical.

The element of the logic structure of data is the field, which generates the higher level structures. As can be seen from the Table, substantial differences are observed at the highest level in the systems being analyzed in the derivation of the structural types, i.e., at the level of data base composition. Thus, in the ITS-1, ASPID, and NSI-1-DOS systems, the data base has been generalized with a file. In the BANK system, the division is conditioned only by the volume of information organized in the base. Such limitations create specific difficulties in a system, since the composition of the data base should be placed in one file. The application of these systems as standard systems under the conditions of a collective use computer center is difficult, something which is due to the following. At a collective use computer center, there is a large number of forms for the input information from the different subscribers. This information can be organized into a rather complex logic structure, and a change in the structure of even one of the forms requires the regeneration of the entire system, something which is rather labor intensive.

TABLE The Technical Characteristics of the Systems Being Analyzed

Parameters	IPS-1	ASPID	BANK	OKA	OST	SIOD	NSI-1-DOS	NSI-DOS
1. General Information on a system:								
1.1. Designer	TsNIITU	IM AN BSSR	NIIUMS	NITsEVT	IK AN USSR NITsEVT	GNIPIVT	TsNIITU	TsNIITU
1.2. Purpose:								
— General	-	-	+	+	+	+	+	+
— Information retrieval	+	+	-	-	+	-	+	-
— Dialog control system	+	-	-	+	+	-	-	-
2. Functional Capabilities:								
— Control of complex data structures	-	-	+	+	+	+	-	+
— Use of high level languages	-	-	+	+	-	+	-	-
— Data protection	+	-	-	+	+	-	+	-
— Batch processing	+	+	+	+	-	+	+	+
— Remote processing	+	-	-	+	+	-	-	-
3. Nature of the Stored Information								
— Factographic	+	-	+	+	+	+	+	+
— Documental	+	+	-	-	-	-	+	-
4. The Minimal Configuration:								
4.1. Hardware:								
— Type of computer (Minimal configuration)	YeS-1022	YeS-1020	YeS-1020	YeS-1022	YeS-1022	YeS-1020	YeS-1020	YeS-1020
— Volume of the main memory	64 K	64 K	64 K	512 K	128 K	64 K	32 K	64 K
— Number of disk memories	3	1	2	3	4	2	2	2
— Number of magnetic tape units	4	2	2	1	1	2	2	3

[TABLE, continued]

Parameters	IPS-1	ASPID	BANK	OKA	OST	SIOD	NSI-1-DOS	NSI-DOS
4.2. Operating Systems:								
-- Disk systems	Version 1.3	Version 1.3	Version 1.3	-	-	Version 1.3	Version 1.3	Version 1.3
-- Operating systems	-	-	-	Version 4.0	Version 4.0	-	-	-
5. Access at the Level of:								
-- Components	+	-	-	-	+	-	-	-
-- Entries	+	+	+	+	+	+	+	+
-- A group of entries	+	+	+	+	+	+	+	+
6. The Data Logic Organization								
6.1. The Class of Data Structure:								
-- Sequential	+	+	+	+	+	+	+	+
-- Branching	-	-	+	+	-	+	-	+
-- Chain	+	+	+	+	+	+	-	+
6.2. The Data Structure Levels:								
-- Component	+	+	+	+	+	+	+	+
-- Article (entry)	+	+	+	+	+	+	+	+
-- File	+	+	+	+	+	+	+	+
-- Data base	+	+	+	+	+	+	-	+
7. The Physical Organization of the Data (Access Methods):								
-- Sequential	+	+	+	+	+	+	+	+
-- Indexed-sequential	+	+	-	-	-	-	+	-
-- Direct	+	+	+	+	+	+	-	+
-- Telecommunication access	+	-	-	+	+	-	-	-
8. The Functions of the Data Control System								
8.1. Data Editing	+	+	-	+	+	-	+	-

[TABLE, continued]

Parameters	IPS-1	ASPID	BANK	OKA	OST	SIOD	NSI-1-DOS	NSI-DOS
8.2. Arithmetic operations on the data:								
-- Simple counting	+	+	-	-	-	-	+	-
-- Mean value determination	+	+	-	-	-	-	-	-
-- Totals and check sums	+	+	-	-	-	-	+	-
8.3. The Output of Reports:								
-- Formalized by the system	+	-	-	+	+	-	+	-
-- Formalized by the user	-	+	+	+	+	+	+	+
9. Adjustment:								
-- Interpretation	-	-	-	-	-	-	+	-
-- Generation	+	+	+	+	+	+	-	+

Note: The "+" or "-" signs means that the particular system "has" or "does not have" this application respectively.

Key: TsNIITU [the Minsk Central Scientific Research and Design-Technological Institute for Control Organization and Technology];
IM AN BSSR [unknown institute of the Belorussian SSR Academy of Sciences];
NIIUMS [Scientific Research Institute of Control Machines and Systems];
NITsEVT [Scientific Research Center for Electronic Computer Equipment (Moscow)];
IK AN USSR [Cybernetics Institute of the Ukrainian SSR Academy of Sciences];
GNIPIVT [unknown main or state scientific and design institute for computer equipment].

As can be seen from the Table, the structural composition of the data base in the majority of systems is determined by the system itself on one hand, and on the other by the user, i.e., there are specific limitations on the composition of the data base structure. Thus, in the SIOD and NSI-DOS systems, the compositional configuration of the data base cannot include more than four logically related files. And if additional separate files must be created, then it will be necessary to use some other systems.

The manipulation of the data is related to the execution of the following operations in the systems analyzed here, where these operations can be broken down into four groups according to functional purpose: description functions, input-output functions, operation functions and special (service) functions.

Description functions provide for the following: the description of input (or output) entries; the description of the regions of data exchange between the programs of the user and the system programs; and the description of output tabulograms.

Input-output functions provide for the execution of the following operations: the entry of the original data into the files being organized by the system; exchange with entries or groups of entries related by logic relationships, between the main memory and the main files; information output to peripheral vehicles.

Operational functions provide for the execution of the following operations: the transfer of the content of a field (or group of fields) from one memory region to another; the comparison of the content of one field with a specified constant or with another field according to criteria (greater than, less than, equal to, equal to tabular data, etc.); editing for the generation of a printout format and the execution of calculations (addition, subtraction, multiplication, division).

The special functions of the systems being analyzed allow for the execution of the following operations: the retrieval of entries related by group relationships; the protection of data against unauthorized access; service functions.

It should be noted that the most standardized input-output functions are the description and operational ones. The special functions depend on the approach to the design of the system and its purpose.

The use of these systems in data processing is quite effective. Thus, for example, the use of the NSI-DOS system at the First Moscow Clock Plant made it possible to curtail the number of programs for the solution of individual problems by two to six times as compared to the traditional method, and naturally, led to a reduction in machine time.

It is difficult to extrapolate the obtained results to collective use computer centers. The effectiveness of operating systems for the organization of automated data banks at collective use computer centers can be determined only following the accumulation of sufficient experience in the functioning of such systems. But even at the present stage in the design and application of systems for the organization of automated banks at collective use computer centers, the conclusion can be drawn that such a system should be rather flexible.

In order to aspire to the role of standardized systems for the organization and management of automated data banks, such a system should possess numerous qualities, which are not easy to combine. In our opinion, such a system should have the following properties:

--Provide for the accumulation, storage and servicing of information, and have fast access to the data;

--Make economic use of peripheral memories, thereby providing for comprehensive storage and utilization of large volumes of data by many system users;

--Provide for an expansion capability;

--Provide for the independence of the applied programs from the data.

Each of the analyzed systems cannot alone aspire to the role of a single unified system for the creation and management of automated banks at collective use computer centers by virtue of the following: the comparatively simple IPS-1, ASPID, SIOD, NSI-DOS and NSI-1-DOS systems, because of their problem orientation, while the more complex BANK and OKA systems are oriented towards data processing in batch mode and cannot be used as information retrieval systems.

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Abstracts of Articles

USSR UDC 681.3.06.41

THE EKSPRESS-1 SYSTEM FOR RAPID ANALYSIS OF EXPERIMENTAL DATA IN FIELD TESTS OF COMPLEX OBJECTS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6(38), Nov/Dec 78 pp 125-128 manuscript received 20 Jun 78

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[Abstract] The author describes the Ekspress-1 digital computer complex for multichannel statistical processing and rapid analysis of experimental data in field tests of complicated objects such as ships, aircraft and powerplants. The system was developed at the Special Design Office of Mathematical Machines and Systems of the Institute of Cybernetics of the Ukrainian Academy of Sciences, and has been put to extensive use in the investigation of various characteristics of many complicated processes, certification of objects, in situ tests, planning of experiments, metrological and other applications. The Ekspress-1 system is designed for real-time data processing in solution of the following problems: reliable measurement and recording of experimental data; sample processing and rapid analysis of random high-speed processes on the basis of probability and mathematical statistics to get basic probabilistic characteristics of large amounts of experimental data as they arrive from the object and after processing; man-machine interaction with modification of the experiment as required. The automated data processing system includes subsystems for handling each of these problems. The photograph shows the Ekspress-1 system, which is modular for flexibility and ease of transportation to the test site. The complex has two channels for input of experimental data, a maximum reception rate of 12.6 kHz per channel, a sensor interrogation rate of 250 Hz, accommodates up to 1024 sensors, and has two working memories with total capacity of 32K bytes, access time of 2 μs and sampling time of 0.7 μs. The tape recorder is of

the pulse-code type with twenty channels and a capacity of about 20M bytes. Word length is 16 bits, and speed is 600,000 logic operations per second. The modular principle is used for hardware and software. The overall dimensions of the computer are 610x490x340 mm, and weight is no more than 35 kg. Power consumption from a 220 VAC line is no more than 380 W. Figures 3; references 4 (Russian).

VI. GENERAL INFORMATION

A. Conferences

Translations of Articles

ALL-UNION CONFERENCE ON COMPUTING SYSTEMS, NETWORKS AND TIME-SHARING CENTERS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6, Nov/Dec 78 p 136

[Article by L. B. Efros]

[Text] From 23 through 25 October, 1978, the All-Union Conference on Computing Systems, Networks and Time-Sharing Centers (VSS i TsKP-78) was held in Novosibirsk; participants included over 180 scientists and experts representing some 80 organizations and 32 cities of the country.

Academician G. I. Marchuk, chairman of the conference's organizational committee, formulated the basic problem areas in his opening speech and laid out the basic trends of scientific research and design and planning work on the design of evolved time-sharing systems for computer hardware. Plenary reports were given by academician V. M. Glushkov, Academician E. A. Yakubaytis of the LatvSSR Academy of Sciences, N. N. Govorun and A. P. Yershov, corresponding members of the USSR Academy of Sciences, as well as survey reports on 105 scientific reports published in conference materials on the following topics: conception and architecture (A. N. Myamlin, dr in technical sciences and L. B. Efros, candidate in technical sciences); system-wide software (A. A. Stogniy, corresponding member of UkSSR Academy of Sciences; and R. D. Mishkovich); hardware (Yu. V. Metlyayev and S. T. Vas'kov, candidates in technical sciences); problem-solving software (A. L. Shchers, candidate in technical sciences and M. V. Glazyrin, candidate in economic sciences); simulation (G. T. Artamonov, dr in technical sciences and M. I. Nechepurenko, dr in physicomathematical sciences); and questions of network construction (S. I. Samoylenko, dr in technical sciences and Yu. I. Mitrofanov, candidate in technical sciences).

Beyond the conference program, its participants were thoroughly familiarized with the concept and features of realization of a plan to design a time-sharing computing complex at the Novosibirsk Science Center of the Siberian Division of the USSR Academy of Sciences (the VTsKP project).

A general open discussion was conducted on topics of the conference.

In a conference resolution it was noted that work on analysis of scientific foundations, planning and realization of evolved computing systems is being intensively carried out by several scientific and industrial teams of the country. All this work will be mutually reinforced and as a whole reflects the basic trends toward raising efficiency of utilization of computer technology.

The conference recommended intensification of scientific research on the design of technical and programming measuring systems to conduct full-scale research, determine the characteristics and develop criteria for operating efficiency of VSS and TsKP, as well as scientifically justified technology to produce applied software oriented toward work with VSS and TsKP.

The conference focused attention of the State Committee of the USSR Council of Ministers On Science and Technology and the USSR Academy of Sciences on the advisability of the following:

--creation of an interagency working group to work out a conceptual model of a computer network and elaborate a plant of standards of protocols of various levels for computer networks on its basis;

--priority technical and material and personnel support of experimental work on realization of VSS TsKP;

--organization of closer and more effective interaction of planners and developers of VSS and TsKP with industry producing computers and data transmission hardware.

The conference supported Proposal III of the All-Union School of the Scientific Council on the Complex Problem of Cybernetics of the USSR Academy of Sciences dealing with encoding and transmission of information in computer networks and the creation of a nationwide journal entitled "Computer Networks."

The conference requested the Siberian Division of USSR Academy of Sciences to examine the question of possible regular conferences on VSS and TsKP at USSR Academy of Sciences' Siberian Division.

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B. Personalities

Translations of Articles

LIST OF AUTHORS FOR THE JOURNAL UPRAVLYAYUSHCHIYE SISTEMY I MASHINY

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 6, Nov/Dec 78
pp 142-143

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